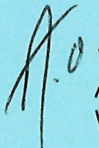


**STATE OF NEW HAMPSHIRE
INTER-DEPARTMENT COMMUNICATION**

FROM:  Andrew O'Sullivan
Wetlands Program Manager

DATE: December 11, 2019

AT (OFFICE): Department of
Transportation

SUBJECT Dredge & Fill Application Bureau of
Jaffrey, 2019-M412-1 Environment

TO Karl Benedict, Public Works Permitting Officer
New Hampshire Wetlands Bureau
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Forwarded herewith is the application package prepared by NH DOT District 4 for the subject minor impact project. This project is classified as minor per Env-Wt 303.03(h), 303.03(l), and 903.01(f)(1)c however, an alternative design form was submitted with the application. NHDOT looks to NHDES to determine the final category classification. The project is located on Dublin Road in the Town of Jaffrey, NH. The proposed work consists of replacing two deteriorating pipes: the first is an existing 4'x6' squashed CMP and will be replaced with a 6' plastic pipe and extended a total of 11'. The second is an existing 5' CMP and will be replaced with a 5' plastic pipe and extended a total of 11'.

This project was reviewed at the Natural Resource Agency Coordination Meeting on November 20, 2019. A copy of the minutes is included with this application package. A copy of this application and plans can be accessed on the Departments website via the following link: <http://www.nh.gov/dot/org/projectdevelopment/environment/units/program-management/wetland-applications.htm>

This project requires mitigation. NHDOT met with Lori Sommer and Karl Benedict on December 5, 2019 to discuss mitigation. The discussion is documented in the included mitigation narrative. In summary some self-mitigation credits were agreed upon as well as a one-time in lieu fee payment of \$3,692.47 to the NHDES Aquatic Restoration Fund (ARM) for 14LF of permanent channel impacts.

The lead people to contact for this project are Kevin Belanger, Highway Maintenance District 4 (352-2302 or Kevin.Belanger@dot.nh.gov) or Sarah Large, Wetlands Program Analyst, Bureau of Environment (271-3226 or sarah.large@dot.nh.gov).

A payment voucher has been processed for this application (Voucher #591395) in the amount of \$804.

If and when this application meets with the approval of the Bureau, please send the permit directly to Andrew O'Sullivan, Wetlands Program Manager, Bureau of Environment.

AMO:sel
Enclosures

cc:
BOE Original
Town of Jaffrey (4 copies via certified mail)
David Trubey, NH Division of Historic Resources (Cultural Review Within)
Carol Henderson, NH Fish & Game (via electronic notification)
Maria Tur, US Fish & Wildlife (via electronic notification)
Mark Kern, US Environmental Protection Agency (via electronic notification)
Michael Hicks, US Army Corp of Engineers (via electronic notification)
Kevin Nyhan, BOE (via electronic notification)



WETLANDS PERMIT APPLICATION

Water Division/ Wetlands Bureau Land Resources Management

Check the status of your application: www.des.nh.gov/onestop



RSA/Rule: RSA 482-A/ Env-Wt 100-900

| | | | |
|--------------|------------------|---------------------|----------|
| Project Name | Project Location | Project Description | File No. |
| | | | |
| | | | |
| | | | |

1. REVIEW TIME: Indicate your Review Time below. To determine review time, refer to [Guidance Document A](#) for instructions.

☒ Standard Review (Minimum, Minor or Major Impact)

☐ Expedited Review (Minimum Impact only)

2. MITIGATION REQUIREMENT:

If mitigation is required, a Mitigation-Pre Application meeting must occur prior to submitting this Wetlands Permit Application. To determine if mitigation is required, please refer to the [Determine if Mitigation is Required Frequently Asked Questions](#).

Mitigation Pre-Application Meeting Date: Month: 12 Day: 03 Year: 2019

☐ N/A - Mitigation is not required

3. PROJECT LOCATION:

Separate wetland permit applications must be submitted for each municipality within which wetland impacts occur.

ADDRESS: **Dublin Rd over un-named stream**

TOWN/CITY: **Jaffrey**

TAX MAP:

BLOCK:

LOT:

UNIT:

USGS TOPO MAP WATERBODY NAME: **Un-named**

☐ NA

STREAM WATERSHED SIZE: **0.58/0.66 sq.mi.**

☐ NA

LOCATION COORDINATES (If known): **42.84477,-72.07410 / 42.84130,-72.07209**

☒ Latitude/Longitude ☐ UTM ☐ State Plane

4. PROJECT DESCRIPTION:

Provide a brief description of the project outlining the scope of work. Attach additional sheets as needed to provide a detailed explanation of your project. DO NOT reply "See Attached" in the space provided below.

Replace 2 pipes on Dublin Road in Jaffrey NH. The first is an existing 4x6' squash pipe with a history of blockage causing overtopping. It will be replaced with a 6' diameter plastic pipe with a total of 11' extension. The second is a 5' diameter CMP in poor condition with no history of flooding will be replaced with a 5' diameter plastic pipe with a total of 11' extension.

5. SHORELINE FRONTAGE:

☒ N/A This does not have shoreline frontage.

SHORELINE FRONTAGE:

Shoreline Frontage is calculated by determining the average of the distances of the actual natural navigable shoreline frontage and a straight line drawn between the property lines, both of which are measured at the normal high water line ([Env-Wt 101.89](#)).

6. RELATED NHDES LAND RESOURCES MANAGEMENT PERMIT APPLICATIONS ASSOCIATED WITH THIS PROJECT:

Please indicate if any of the following permit applications are required and, if required, the status of the application.

To determine if other Land Resources Management Permits are required, refer to the [Land Resources Management Webpage](#).

| Permit Type | Permit Required | File Number | Permit Application Status |
|---|---|-------------|--|
| Alteration of Terrain Permit Per RSA 485-A:17 | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | _____ | <input type="checkbox"/> APPROVED <input type="checkbox"/> PENDING <input type="checkbox"/> DENIED |
| Individual Sewerage Disposal per RSA 485-A:2 | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | _____ | <input type="checkbox"/> APPROVED <input type="checkbox"/> PENDING <input type="checkbox"/> DENIED |
| Subdivision Approval Per RSA 485-A | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | _____ | <input type="checkbox"/> APPROVED <input type="checkbox"/> PENDING <input type="checkbox"/> DENIED |
| Shoreland Permit Per RSA 483-B | <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO | _____ | <input type="checkbox"/> APPROVED <input type="checkbox"/> PENDING <input type="checkbox"/> DENIED |

7. NATURAL HERITAGE BUREAU & DESIGNATED RIVERS:

See the [Instructions & Required Attachments](#) document for instructions to complete a & b below.

a. Natural Heritage Bureau File ID: NHB 19 - 2595

b. ☐ This project is within a [Designated River](#) corridor. The project is within 4 mile of: _____; and
date a copy of the application was sent to the [Local River Manager](#) & [Advisory Committee](#): Month: ____ Day: ____ Year: ____

☒ N/A - This project is not within a Designated River corridor.

lrn@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

8. APPLICANT INFORMATION (Desired permit holder)LAST NAME, FIRST NAME, M.I.: **NHDOT District 4**TRUST / COMPANY NAME: **NH Dept. of Transportation**MAILING ADDRESS: **19 Base Hill Rd**TOWN/CITY: **Swanzey**STATE: **NH**ZIP CODE: **03446**EMAIL or FAX: **kevin.belanger@dot.nh.gov**PHONE: **603-352-2302**ELECTRONIC COMMUNICATION: By initialing here: **KB**, I hereby authorize NHDES to communicate all matters relative to this application electronically.**9. PROPERTY OWNER INFORMATION (If different than applicant)**LAST NAME, FIRST NAME, M.I.: **NH Dept. of Transportation**TRUST / COMPANY NAME: **NH Dept. of Transportation**MAILING ADDRESS: **PO Box 483**TOWN/CITY: **Concord**STATE: **NH**ZIP CODE: **03302**EMAIL or FAX: **Andrew.O'Sullivan@dot.nh.gov**PHONE: **603-271-3226**ELECTRONIC COMMUNICATION: By initialing here **AO**, I hereby authorize NHDES to communicate all matters relative to this application electronically.**10. AUTHORIZED AGENT INFORMATION**

LAST NAME, FIRST NAME, M.I.:

COMPANY NAME:

MAILING ADDRESS:

TOWN/CITY:

STATE:

ZIP CODE:

EMAIL or FAX:

PHONE:

ELECTRONIC COMMUNICATION: By initialing here _____, I hereby authorize NHDES to communicate all matters relative to this application electronically.

11. PROPERTY OWNER SIGNATURE:See the [Instructions & Required Attachments](#) document for clarification of the below statements

By signing the application, I am certifying that:

1. I authorize the applicant and/or agent indicated on this form to act in my behalf in the processing of this application, and to furnish upon request, supplemental information in support of this permit application.
2. I have reviewed and submitted information & attachments outlined in the [Instructions and Required Attachment](#) document.
3. All abutters have been identified in accordance with RSA 482-A:3, I and Env-Wt 100-900.
4. I have read and provided the required information outlined in Env-Wt 302.04 for the applicable project type.
5. I have read and understand Env-Wt 302.03 and have chosen the least impacting alternative.
6. Any structure that I am proposing to repair/replace was either previously permitted by the Wetlands Bureau or would be considered grandfathered per Env-Wt 101.47.
7. I have submitted a Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) to the NH State Historic Preservation Officer (SHPO) at the NH Division of Historical Resources to identify the presence of historical/ archeological resources while coordinating with the lead federal agency for National Historic Preservation Act (NHPA) 106 compliance.
8. I authorize NHDES and the municipal conservation commission to inspect the site of the proposed project.
9. I have reviewed the information being submitted and that to the best of my knowledge the information is true and accurate.
10. I understand that the willful submission of falsified or misrepresented information to the NHDES is a criminal act, which may result in legal action.
11. I am aware that the work I am proposing may require additional state, local or federal permits which I am responsible for obtaining.
12. The mailing addresses I have provided are up to date and appropriate for receipt of NHDES correspondence. NHDES will not forward returned mail.



Property Owner Signature

John Kallfelz

Print name legibly

12/2/2019

Date

irm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095


www.des.nh.gov

MUNICIPAL SIGNATURES

12. CONSERVATION COMMISSION SIGNATURE

The signature below certifies that the municipal conservation commission has reviewed this application, and:

1. Waives its right to intervene per RSA 482-A:11;
2. Believes that the application and submitted plans accurately represent the proposed project; and
3. Has no objection to permitting the proposed work.

| | | |
|--|--------------------|------|
|  | Print name legibly | Date |
|--|--------------------|------|

DIRECTIONS FOR CONSERVATION COMMISSION

1. Expedited review **ONLY** requires that the conservation commission's signature is obtained in the space above.
2. Expedited review requires the Conservation Commission signature be obtained **prior** to the submittal of the original application to the Town/City Clerk for signature.
3. The Conservation Commission may refuse to sign. If the Conservation Commission does not sign this statement for any reason, the application is not eligible for expedited review and the application will be reviewed in the standard review time frame.

13. TOWN / CITY CLERK SIGNATURE

As required by Chapter 482-A:3 (amended 2014), I hereby certify that the applicant has filed four application forms, four detailed plans, and four USGS location maps with the town/city indicated below.

| | | | |
|--|--------------------|-----------|------|
|  | Print name legibly | Town/City | Date |
|--|--------------------|-----------|------|

DIRECTIONS FOR TOWN/CITY CLERK:

Per RSA 482-A:3, I

1. For applications where "Expedited Review" is checked on page 1, if the Conservation Commission signature is not present, NHDES will accept the permit application, but it will NOT receive the expedited review time.
2. IMMEDIATELY sign the original application form and four copies in the signature space provided above;
3. Return the signed original application form and attachments to the applicant so that the applicant may submit the application form and attachments to NHDES by mail or hand delivery.
4. IMMEDIATELY distribute a copy of the application with one complete set of attachments to each of the following bodies: the municipal Conservation Commission, the local governing body (Board of Selectmen or Town/City Council), and the Planning Board; and
5. Retain one copy of the application form and one complete set of attachments and make them reasonably accessible for public review.

DIRECTIONS FOR APPLICANT:

1. Submit the single, original permit application form bearing the signature of the Town/ City Clerk, additional materials, and the application fee to NHDES by mail or hand delivery.

lrn@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

14. IMPACT AREA:

For each jurisdictional area that will be/has been impacted, provide square feet and, if applicable, linear feet of impact.

Permanent: impacts that will remain after the project is complete.

Temporary: impacts not intended to remain (and will be restored to pre-construction conditions) after the project is completed.

Intermittent Streams: linear footage distance of disturbance is measured along the thread of the channel.

Perennial Streams / Rivers: the total linear footage distance is calculated by summing the lengths of disturbance to the channel and each bank.

| JURISDICTIONAL AREA | PERMANENT Sq. Ft. / Lin. Ft. | | TEMPORARY Sq. Ft. / Lin. Ft. | |
|-------------------------------------|---------------------------------|------------------------------|---------------------------------|------------------------------|
| Forested wetland | 192 | <input type="checkbox"/> ATF | 295 | <input type="checkbox"/> ATF |
| Scrub-shrub wetland | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Emergent wetland | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Wet meadow | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Intermittent stream channel | / | <input type="checkbox"/> ATF | / | <input type="checkbox"/> ATF |
| Perennial Stream / River channel | 490 / 39 | <input type="checkbox"/> ATF | 500 / 33 | <input type="checkbox"/> ATF |
| Lake / Pond | / | <input type="checkbox"/> ATF | / | <input type="checkbox"/> ATF |
| Bank - Intermittent stream | / | <input type="checkbox"/> ATF | / | <input type="checkbox"/> ATF |
| Bank - Perennial stream / River | 120 / 29 | <input type="checkbox"/> ATF | 413 / 70 | <input type="checkbox"/> ATF |
| Bank - Lake / Pond | / | <input type="checkbox"/> ATF | / | <input type="checkbox"/> ATF |
| Tidal water | / | <input type="checkbox"/> ATF | / | <input type="checkbox"/> ATF |
| Salt marsh | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Sand dune | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Prime wetland | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Prime wetland buffer | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Undeveloped Tidal Buffer Zone (TBZ) | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Previously-developed upland in TBZ | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Docking - Lake / Pond | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Docking - River | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Docking - Tidal Water | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| Vernal Pool | | <input type="checkbox"/> ATF | | <input type="checkbox"/> ATF |
| TOTAL | 802 / 68 | | 1208 / 103 | |

15. APPLICATION FEE: See the Instructions & Required Attachments document for further instruction

☐ Minimum Impact Fee or Fee for Non-enforcement related, publicly-funded and supervised restoration projects, regardless of impact classification (see RSA 482-A:3, 1(c)): Flat fee of \$ 400

☐ Minor or Major Impact Fee: Calculate using the below table below

Permanent and Temporary (non-docking) 2010 sq. ft. X \$0.40 = \$ 804

Temporary (seasonal) docking structure: sq. ft. X \$2.00 = \$

Permanent docking structure: sq. ft. X \$4.00 = \$

Projects proposing shoreline structures (including docks) add \$400 = \$

Total = \$ 804

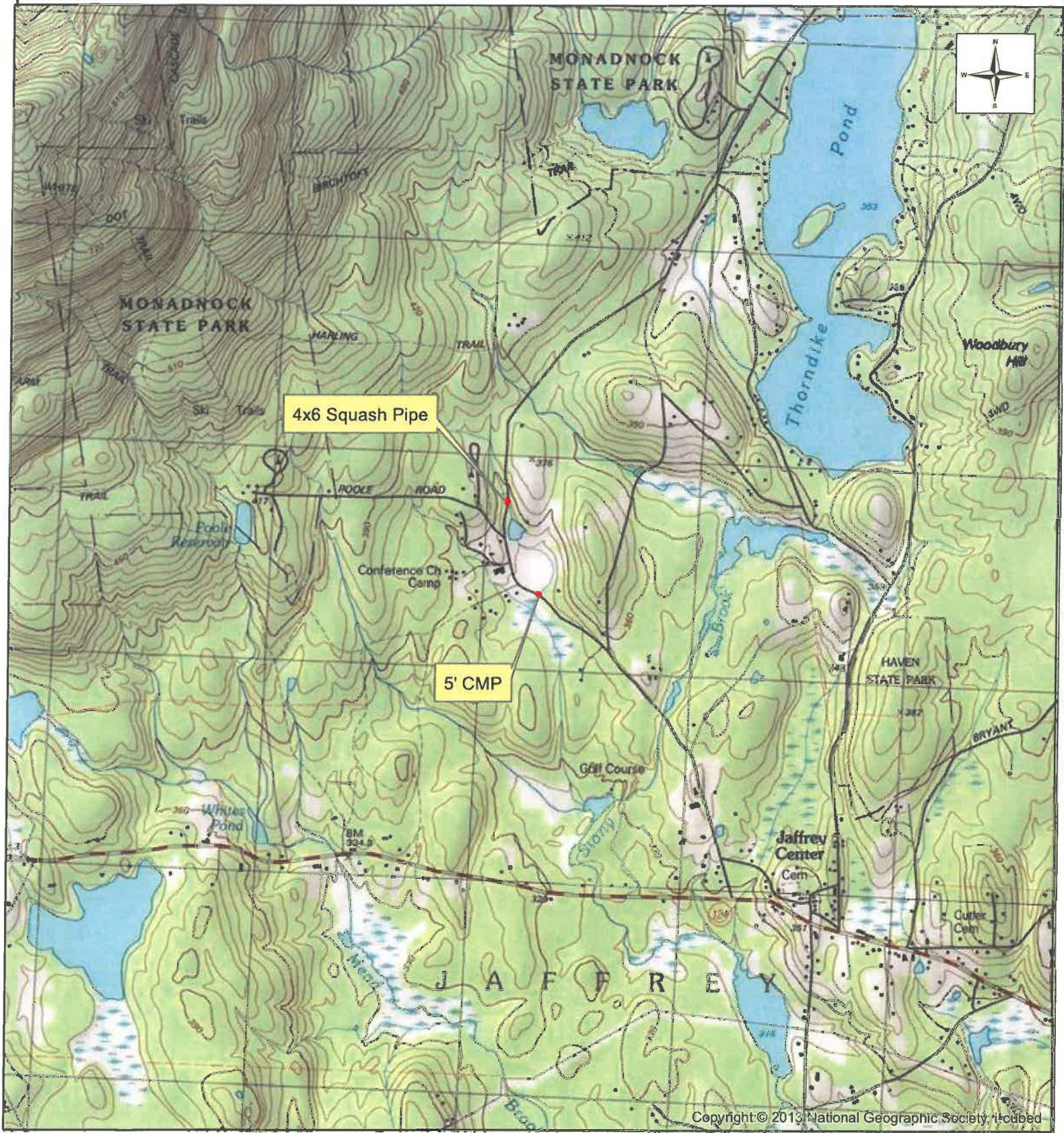
The Application Fee is the above calculated Total or \$400, whichever is greater = \$ 804

lrm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

Jaffrey, 2019-M412-1



Copyright © 2013 National Geographic Society. 1:24,000



Map depicting District 4 Dublin Rd in Jaffrey for culvert replacement project with USGS topo.

1:24,000

Map created by Arin Mills on 11/5/2019

Source: S:\Environment\PROJECTS\JAFFREY\2019-M412-1

Legend
Jaffrey-2019-M412-1





WETLANDS PERMIT APPLICATION – ATTACHMENT A
MINOR AND MAJOR - 20 QUESTIONS
 Land Resources Management
 Wetlands Bureau

Check the Status of your application: www.des.nh.gov/onestop



RSA/ Rule: RSA 482-A, Env-Wt 100-900

Env-Wt 302.04 Requirements for Application Evaluation - For any major or minor project, the applicant shall demonstrate by plan and example that the following factors have been considered in the project's design in assessing the impact of the proposed project to areas and environments under the department's jurisdiction. Respond with statements demonstrating:

1. The need for the proposed impact.

The two existing metal pipes are in poor condition and are in need of replacement, if they are not replaced failure could occur resulting in road closure and impacts to highway safety. A failure may also cause an environmental impact of sedimentation in the wetlands.

2. That the alternative proposed by the applicant is the one with the least impact to wetlands or surface waters on site.

The 5' diameter CMP has no history of flooding and we will replace it with a new 5' plastic pipe. The pipe will be extended 5' at the inlet and 6' at the outlet to provide a safer shoulder to the traveling public. A new stone header will also be installed at both the inlet and outlet.

The existing 4' x 6' squash pipe has historically become plugged with debris and overtopped the road during a heavy rain event. The plan is to install a 6' diameter plastic pipe to increase the ability of the pipe to pass any debris during a high flow situation. The pipe will be extended 3' at the inlet and 8' at the outlet to provide a more stable road shoulder. The invert of the pipe will be set to match the existing streambed elevation in order to remove the perch condition that currently exists. The streambed at the invert will be regraded to meet the elevation of the newly installed pipe and to restore the channel, eliminating areas of aggregation which can catch debris and sediment.

The above proposed pipe installations are the least impacting to the surrounding wetlands as they will be placed in the same alignment as the existing pipes, therefore reducing the overall disturbance area. The 5' CMP has not shown a history of flooding. The squash pipe has a history of debris catchment and therefore will be enlarged to accommodate debris passage during storm events. Minimal additional excavation will be required to install the larger volume pipe in the same alignment. Both pipes will be lengthened to provide an enlarged road shoulder, increasing safety for the traveling public. This extension and installation of new headers will also reduce sedimentation resulting from the deteriorating road shoulder.

Alternatives considered were 'No Action' at both locations, which would result in continued rusting of the pipes and eventual crossing and road failure causing sedimentation in the surrounding water resources.

lm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

3. The type and classification of the wetlands involved.

At the 5' Diameter Pipe:

R2UB12: Riverine, Lower Perennial, Unconsolidated Bottom, Cobble-Gravel/Sand

PFO1E: Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded/Saturated

At the proposed 6' diameter pipe:

R2UB12: Riverine, Lower Perennial, Unconsolidated Bottom, Cobble-Gravel/Sand

Bank

4. The relationship of the proposed wetlands to be impacted relative to nearby wetlands and surface waters.

No wetlands were found immediately adjacent to the river during the field delineation. The 4' x 6' squash pipe has no associated wetlands surrounding the stream crossing. The crossing drains the steep terrain of the east side of Mt Monadnock and flow approximately 250' before reaching an impounded pond downstream.

The 5' CMP has a large wet meadow, presumably an old agricultural field, upstream on the west bank and a forested wetland on the east bank. These wetland resources provide flood storage capacity during storm events. Downstream of the crossing is also a large forest wetland, also providing flood storage capacity.

The un-named stream predominantly drains undeveloped forest on the eastern slope of Mt Monadnock. Beyond the crossings the stream further flows approximately 0.5 miles downstream where it flows into a small pond before reaching Stony Brook. Stony Brook further leads to Mountain Brook, a tributary to the Contoocook River further south in Jaffrey.

5. The rarity of the wetland, surface water, sand dunes, or tidal buffer zone area.

No rare wetland resources were identified surrounding the crossings.

6. The surface area of the wetlands that will be impacted.

5 Foot Pipe:

Total impact of 912 s.f. of wetlands impact, with 342 s.f. of permanent impacts and 570 s.f. of temporary impacts.

425 s.f. of Riverine (150 s.f. of permanent and 275 s.f. of temporary)

487 s.f. of Palustrine (192 s.f. of permanent and 295 s.f. of temporary)

6 Foot Pipe:

Total impact of 1,098 s.f. of wetlands impact, with 460 s.f. of permanent impacts and 638 s.f. of temporary impacts.

565 s.f. of Riverine (340 s.f. of permanent impacts and 225 s.f. of temporary impacts)

533 s.f. of Bank (120 s.f. of permanent impacts and 413 s.f. of temporary impacts)

lm@des.nh.gov or (603) 271-2147

NHDES Wetlands Bureau, 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095

www.des.nh.gov

7. The impact on plants, fish and wildlife including, but not limited to:

- a. Rare, special concern species;
- b. State and federally listed threatened and endangered species;
- c. Species at the extremities of their ranges;
- d. Migratory fish and wildlife;
- e. Exemplary natural communities identified by the DRED-NHB; and
- f. Vernal pools.

- a. Results of the NH Natural Heritage Bureau database search (NHB19-2595) determined that although there were NHB records present in the vicinity, there are no anticipated impacts from the proposed project.
- b. No state or federally listed species are known to occur in the project area.
- c. No species at the extremities of their range are known to occur in the project area.
- d. The proposed project will overall improve fish passage with the elimination of the perch at the outlet of the squash pipe. Fish passage is already negatively impacted with dams, Arc Pond dam immediately downstream of the squash and Green Wildlife Pond Dam approximately 2 miles downstream.
- e. No exemplary natural communities were identified within the project area per the NHB database search.
- f. Field surveys did not identify any vernal pool in or immediately adjacent to the project.

8. The impact of the proposed project on public commerce, navigation and recreation.

The work will have a minimal impact on traffic as alternating one way traffic will be required during construction. No recreational facilities have been identified in the project area. Monadnock State Park entrance via Poole Rd is in the vicinity of the project area, although the roadway will maintain open to one-lane traffic throughout construction and will be temporary in nature.

- 9. The extent to which a project interferes with the aesthetic interests of the general public. For example, where an applicant proposes the construction of a retaining wall on the bank of a lake, the applicant shall be required to indicate the type of material to be used and the effect of the construction of the wall on the view of other users of the lake.**

No negative aesthetic impacts are associated with the project. The proposed crossings are in the same alignment as they appear today, and will not significantly change the aesthetics of area.

10. The extent to which a project interferes with or obstructs public rights of passage or access. For example, where the applicant proposes to construct a dock in a narrow channel, the applicant shall be required to document the extent to which the dock would block or interfere with the passage through this area.

No impacts to the public right of passage will occur. The un-named tributary is not navigable by boat.

11. The impact upon abutting owners pursuant to RSA 482-A:11, II. For example, if an applicant is proposing to rip-rap a stream, the applicant shall be required to document the effect of such work on upstream and downstream abutting properties.

No impacts are anticipated to abutting property owners. The repair will better serve the abutting property owners who travel the road by maintaining the crossing in passable condition.

12. The benefit of a project to the health, safety, and well being of the general public.

Replacing the pipes will benefit the general public by maintaining the crossings in passable condition. Failure to maintain will lead to possible culvert failure and potential closure of the roadway.

13. The impact of a proposed project on quantity or quality of surface and ground water. For example, where an applicant proposes to fill wetlands the applicant shall be required to document the impact of the proposed fill on the amount of drainage entering the site versus the amount of drainage exiting the site and the difference in the quality of water entering and exiting the site.

The proposed project will have a positive impact on the quality of the surface water by eliminating the perch and increasing the size of the pipe at the 4'x6' squash pipe location. Both pipes will have a positive impact on water quality by eliminating sedimentation into the stream from road shoulder deterioration. Neither crossing will increase the quantity of surface water and they will either remain the same size (5'CMP) or increase size (4'x6' squash to 6'round pipe).

No additional impervious area will be added to the project area.

14. The potential of a proposed project to cause or increase flooding, erosion, or sedimentation.

Flooding: The proposed project will not increase flooding as both pipes have either the same (5') or increased (4'x6' squash) flood capacity as they do today. A drainage analysis was conducted and found the crossing will both accommodate flooding without washing out the roadway or structure. The 5' crossing has no history of flooding, while the 4'x6' squash has a history of flooding caused by catchment of debris. The squash pipe will be increased to a 6' plastic pipe to allow for increased debris passage.

Erosion & sedimentation: The proposed project will not cause erosion or sedimentation through use of erosion control BMP's throughout construction.

15. The extent to which a project that is located in surface waters reflects or redirects current or wave energy which might cause damage or hazards.

The proposed project will not reflect or redirect current or wave energy as both replacements are in the same alignment as the existing pipes. No change is anticipated from the flow of water from today.

16. The cumulative impact that would result if all parties owning or abutting a portion of the affected wetland or wetland complex were also permitted alterations to the wetland proportional to the extent of their property rights. For example, an applicant who owns only a portion of a wetland shall document the applicant's percentage of ownership of that wetland and the percentage of that ownership that would be impacted.

There are no additional transportation related structures nearby the project area therefore this work will not affect additional landowners along the stream from this work. All work will remain in the existing State ROW.

17. The impact of the proposed project on the values and functions of the total wetland or wetland complex.

The proposed project will both have either no change or benefit to the total functions and values of the wetlands impacted. Since the alignment of the crossing will not change the crossing will continue to transport water through the system from higher elevation to lower elevation. The crossings are showing signs of deterioration, the replacement will ensure water will continue to be transported, while the extension will increase the road shoulder and reduce sedimentation from deterioration of the shoulder at the inlet/outlet.

The squash pipe currently is perched at the outlet and this will be eliminated with the proposed new pipe, restoring stream connectivity. The squash pipe also historically has captured debris, causing overtopping of the roadway during storm events. The increase in size will accommodate debris passage, reducing the potential for overtopping.

18. The impact upon the value of the sites included in the latest published edition of the National Register of Natural Landmarks, or sites eligible for such publication.

A BOE Cultural Resources review did not reveal and any resources listed on the National Historic Register or other eligible resources within the project area or impacted from the proposed project.

19. The impact upon the value of areas named in acts of congress or presidential proclamations as national rivers, national wilderness areas, national lakeshores, and such areas as may be established under federal, state, or municipal laws for similar and related purposes such as estuarine and marine sanctuaries.

No areas named in acts of congress or presidential proclamations as national river, national wilderness areas, national lakeshores, or such areas were determined to be within the project area.

20. The degree to which a project redirects water from one watershed to another.

There are no changes to the pre existing flow patterns and will not redirect the flow of water from one watershed to another.

Additional comments

From: Bisignano, Christopher J CIV <Christopher.J.Bisignano@uscg.mil>
Sent: Tuesday, August 27, 2019 11:24 AM
To: Mills, Arin
Cc: Rousseau, James L CIV
Subject: FW: Coast Guard Review for DOT Culvert Replacement in Jaffrey (Project #2019-M413-3)

EXTERNAL: Do not open attachments or click on links unless you recognize and trust the sender.

Arin,

We see no CG Bridge Program jurisdiction here.

Best regards,
Chris

From: Rousseau, James L CIV <James.L.Rousseau2@uscg.mil>
Sent: Tuesday, August 27, 2019 11:19 AM
To: Bisignano, Christopher J CIV <Christopher.J.Bisignano@uscg.mil>
Subject: RE: Coast Guard Review for DOT Culvert Replacement in Jaffrey (Project #2019-M413-3)

Chris,

I concur.

Respectfully,

Jim

From: Bisignano, Christopher J CIV <Christopher.J.Bisignano@uscg.mil>
Sent: Tuesday, August 27, 2019 11:18 AM
To: Rousseau, James L CIV <James.L.Rousseau2@uscg.mil>
Subject: FW: Coast Guard Review for DOT Culvert Replacement in Jaffrey (Project #2019-M413-3)

Jim,

Checked Google satellite shot; does not look like anything we need to be concerned with. Not even a waterway name on the map. Closest is Stony Brook.

Chris

From: Mills, Arin <Arin.Mills@dot.nh.gov>
Sent: Tuesday, August 27, 2019 11:01 AM
To: Bisignano, Christopher J CIV <Christopher.J.Bisignano@uscg.mil>; Rousseau, James L CIV <James.L.Rousseau2@uscg.mil>

Subject: [Non-DoD Source] Coast Guard Review for DOT Culvert Replacement in Jaffrey (Project #2019-M413-3)

Chris and/or James,

The NHDOT is proposing a pipe replacement project for two pipes along Dublin Road in Jaffrey and looking for Coast Guard review for potential concerns from this project. . The proposed project is to replace 2 large diameter pipes, 1) 4x6 squash pipe which will be replaced with a 6' diameter pipe 2) 5' cmp to be replaced with a 5' plastic pipe. Both are showing deterioration and have been identified in need of replacement. The project will require a wetland permit from DES. See attached map for location.

Please provide any concerns the Coast Guard may have as it relates to this project. Feel free to reach out if you have any additional questions or information as it relates to the project and I will be happy to assist.

Arin Mills
Environmental Manager, Operations Management
NH Department of Transportation
Bureau of Environment
7 Hazen Drive, Concord, NH 03302
Ph: (603)271-0187
Arin.mills@dot.nh.gov

Natural Resources Meeting Minutes
Jaffrey 2019-M412-1, November 20, 2019

Arin Mills introduced the project for 2 culvert replacements along Dublin Rd in Jaffrey. The project proposes to replace a 4' X 6' X 59' Squash pipe with a 6' x 70' diameter plastic pipe to include a 3' extension on the inlet and an 8' extension on the outlet. The second pipe is an existing 5' X 37' Corrugated Metal Pipe (CMP) to be placed with a 5' X 48' plastic pipe to include a 5' extension on the inlet and 6' extension on the outlet. Both crossings are Tier 2 crossings which are along an un-named tributary to Stony Brook which further drains to Mountain Brook and eventually empties into the Contookook River. The crossings are near the entrance to Monadnock State Park, but not immediately adjacent to park lands. Arin explained there is an impounded pond with a dam, Arc Pond Dam, between the two crossing and south (downstream) of the Squash pipe. The setting of the crossings is rural with agricultural land adjacent with some possible historical ditching.

The 4' X 6' Squash is upstream of the impoundment and no associated wetlands adjacent. Guardrail will be replaced and the shoulder extended to reduce ongoing deterioration. The inlet will be regraded to match the inlet grade and the perch will be eliminated. Design plans were shown with an anticipated 590 square feet of permanent impacts and 645 square feet of temporary impacts to the riverine wetland (stream).

Carol Henderson asked why smooth pipe was chosen versus a corrugated. Arin said she believed this was primarily based on availability of product and ability for crew staff to install as well as cost. Carol mentioned the removal of the perch will improve connectivity for fish with perch elimination. She further mentioned smooth pipe is difficult for turtles to pass and corrugated is easier for them to move through. Carol recommended the bottom of the pipe be roughened to help turtle pass.

Mike Hicks said if Stony Brook is determined to be EFH coordination with NMF will be needed and the EFH form will need to be filled out. Arin will verify if this was determined to be EFH with data. Mike further discussed coordination with Mike Johnson will determine if the EFH Assessment worksheet needs to be filled out. Mike asked to be kept in the loop with that coordination and Arin will coordinate. There was further discussion that if this is determined to be EFH there is a requirement to maintain a % of the stream open for fish passage. Arin will verify the EFH and coordinate with District to discuss construction methods and phasing to meet this, if necessary.

Arin further discussed the results of the resource review for the 4' X 6' Squash and determined no NHB hits, Northern Long-eared bat (NLEB) was determined as potential and a 4(d) consistency determination was done in the event trees were need to be cut, no FEMA floodplains, Tier 2 crossing, AoT permit by rule and 'No potential to Cause Effect' determination from cultural review.

Seta asked if the crossing had a history of flooding. Arin discussed the history of flooding at the squash pipe location was from catchment of debris during a storm event and the proposed pipe is larger to help pass debris and reduce potential for debris to clog the pipe. There was a previous wetland permit which

was a result of debris catchment. The second crossing does not have a history of flooding. Seta asked if the crossings would meet the 100-year flooding and Arin said calculation were done by the project manager and determined to accommodate flooding with overtopping but not wash-out of the roadway during major storm events. Sarah clarified if all volume is passed then Tier 2 replacement is appropriate. Andy further clarified this will be under the existing rules and during a flooding event the roadway will not be compromised. Seta and Karl stated if the crossing is attenuating water then an alternative design is appropriate, but if the water overtops the roadway an analysis will be required to ensure the integrity of the roadway will be maintained. Karl mentioned alternative design is required if the water will overtop the pipe and alternative design will be required. Sarah said we will verify with project manager on calculations and determine the appropriate form.

Arin discussed the 5' CMP crossing further downstream and that much of the flood storage capacity will be held in the upstream agricultural wet meadow. Upstream east and downstream is a forested wetland. The design plan was shown with the 5' extension on the inlet and 6' on the outlet to extend the road shoulder, no perch. Resource review found no NHB 'hits', NLEB consistency determination, no FEMA floodplains and Tier 2 crossing, AoT permit by rule and 'No Potential to Cause Effect' for cultural review. Arin showed and discussed and showed the erosion control plan of coffer dam and dewatering into silt bag with erosion control at perimeter. Arin said the anticipated total impacts are 932 s.f. of permanent and 1,215 s.f. of temporary. Seta asked the anticipated construction date and Arin said summer of 2020. There was a review of the plans and both temporary and permanent impacts. Sarah agreed that a meeting with Lori would be set up to discuss mitigation requirements and potential for self-mitigation under the existing rules.

Mike verified IPaC results and Arin said 4(d) rule consistency was determined as the NLEB was the only species returned for both locations.

Mitigation Narrative

Agreed upon during a mitigation meeting between Lori Sommer, Karl Benedict, Sarah Large and Matt Urban on 12/5/2019 a one-time in lieu fee payment of \$3,692.47 will be paid to NHDES ARM Fund for 14LF of permanent channel impacts due to the loss of channel for 14LF of culvert extension. The remaining permanent channel and bank impacts were discussed as either self-mitigating actions or no mitigation was required because the impacts are needed for the protection of existing infrastructure which is exempt from mitigation per Env-Wt 302.03(c)(2)c. (Included below are minutes from the 12/5/2019 mitigation meeting.)

| DES AQUATIC RESOURCE MITIGATION FUND STREAM PAYMENT CALCULATION | | | |
|--|--|------------------------------------|------------|
| INSERT LINEAR FEET OF IMPACT on BOTH BANKS AND CHANNEL | | Right Bank | |
| | | Left Bank | |
| | | Channel | 14.0000 |
| | | TOTAL IMPACT | 14.0000 |
| | | Stream Impact Cost: | \$3,077.06 |
| | | DES Administrative cost: | |
| | | | \$615.41 |
| ***** | | TOTAL ARM FUND STREAM PAYMENT***** | |
| | | | \$3,692.47 |

Minutes from 12/5/2019 Mitigation Meeting

A meeting to discuss mitigation for Jaffrey, 2019-MM412-1 was held on 12/5/2019. Lori Sommer and Karl Benedict, NHDES, were in attendance as well as Sarah Large and Matt Urban, NHDOT. The proposed work was discussed and photos of the crossings were shown to depict the stream and wetland systems, as well as to show the existing conditions and features as they are today. Sarah Large brought impact plans with linear feet measurements drawn on the plan sheets to aid in the discussion.

The group discussed the downstream 5' CMP replacement first. The existing deteriorated pipe will be replaced with a 5' plastic pipe extended by 5 LF and 6 LF at the inlet and outlet respectively with stone headwalls. S. Large indicated that the banks are currently riprapped at all four quadrants to protect the infrastructure however there will be a loss of 5LF and 6LF of channel due to the extensions. L. Sommer asked if aquatic organism passage had been considered when selecting this alternative. S. Large indicated that at the November 20, 2019 Natural Resource Agency Meeting Carol Henderson, NH F&G, per Kim Tuttle if there was a way to roughen the plastic surface specifically for turtle passage. S. Large indicated that the environmental manager discussed this agency recommendation and it was agreed upon by the district engineer that NHDOT would implement F&G's recommendation. S. Large added that due to the flat diffuse emergent wetland upstream and the flat forested wetland downstream the pipe will likely have water through the crossing most of the time therefore aquatic passage conditions will be the case more often than not. K. Benedict asked what tier crossing this structure is. S. Large indicated that this crossing is a tier 2 crossing and jogged both her's and Karl's memory regarding their decision to file a 904.09 Alternative Design form due to the hydraulics of the crossing. The stream is impounded upstream at a manmade fire damn and then flows through an emergent wetland that has high floodwater storage capacity. The group circled back to the impacts and agreed that an in lieu fee payment would be needed for the 5LF and 6LF of channel loss due to the extensions and that the remaining bank impacts would not trigger mitigation as there is existing riprap and per Env-Wt 302.03(c)(2)c mitigation is not required for the protection of existing infrastructure.

The group then discussed the upstream 4'x6' squashed metal pipe. The existing deteriorated pipe will be replaced with a 6' plastic pipe extended by 3 LF and 8 LF at the inlet and outlet respectively with stone headwalls. S. Large began the discussion by talking about the impacts at the outlet, indicating that both banks are currently riprapped and that there is currently a 0.9'* perch at the outlet and a downstream scour pool (** 10.4' wide x 25.4' long & maximum water depth of 1.5' in the deepest location of the pool.*) S. Large drew the groups attention to the engineer's longitudinal profile of the existing crossing showing the perch and the proposed culvert's profile. S. Large indicated that with the extension and lowering the pipe slightly the new pipe will match the existing stream bed elevation, eliminating the perched condition of the pipe. ***after the meeting S. Large confirmed that the slope is currently 1.1% and the proposed slope of the pipe will still be 1.1%.* The group discussed this design choice as a self-mitigating action therefore not requiring a payment into the ARM Fund. L. Sommer indicated that mitigation monitoring of the outlet condition is expected for this self-mitigating action. M.

Urban indicated that he expected NHDOT providing photos as visual documentation of the mitigation as well as a few depth measurements and brief narrative as the monitoring report.

The group then discussed the work at the inlet. Riprap currently exists along both banks, the pipe will be extended by 3LF, and as noted by the district engineer there is an aggradation of sediment and material upstream of the culvert that was deposited likely over time and/or during a large storm event. L. Sommer and K. Benedict asked if the aggradation at the inlet will be addressed by the upsizing. S. Large indicated that she would discuss with the project engineer to confirm. The group also discussed that the material will be regraded in place to match the surrounding streambed upstream and downstream and restore the streambed back to a more natural condition. The group also discussed access for this work, the needed water diversion, and time it will take to complete the work. M. Urban indicated that it will be a fairly quick process and based on the construction sequence provided by district it is their intention to completed the instream work in two days (per location). The erosion control plans prepared by the district engineer show a sandbag cofferdam blocking off the flow and indicates water will be pumped to a sediment base. Indicated by the district engineer, during the summer the stream is very dry and flow is very little. M. Urban and S. Large indicated that by stopping flow through the crossing it will help the work to be done in the short two-day window. S. Large followed up with the district engineer about access and included the follow up information in the construction sequence included with this application. The district engineer indicated "the excavator will sit on the road. The crew will walk over the bank. There is potential to trim branches to allow the excavator to swing and not damage limbs." The group agreed that the bank impacts were self-mitigating and that the regrading of the streambed material was an effort to restore the streambed and better connect the channel for aquatic organism passage and sediment transport and that these impacts would also be self-mitigating. Monitoring of the streambed will be expected for this impact location as well. An in lieu fee payment would be needed for the 3LF of channel loss due to the pipe extension at the inlet.

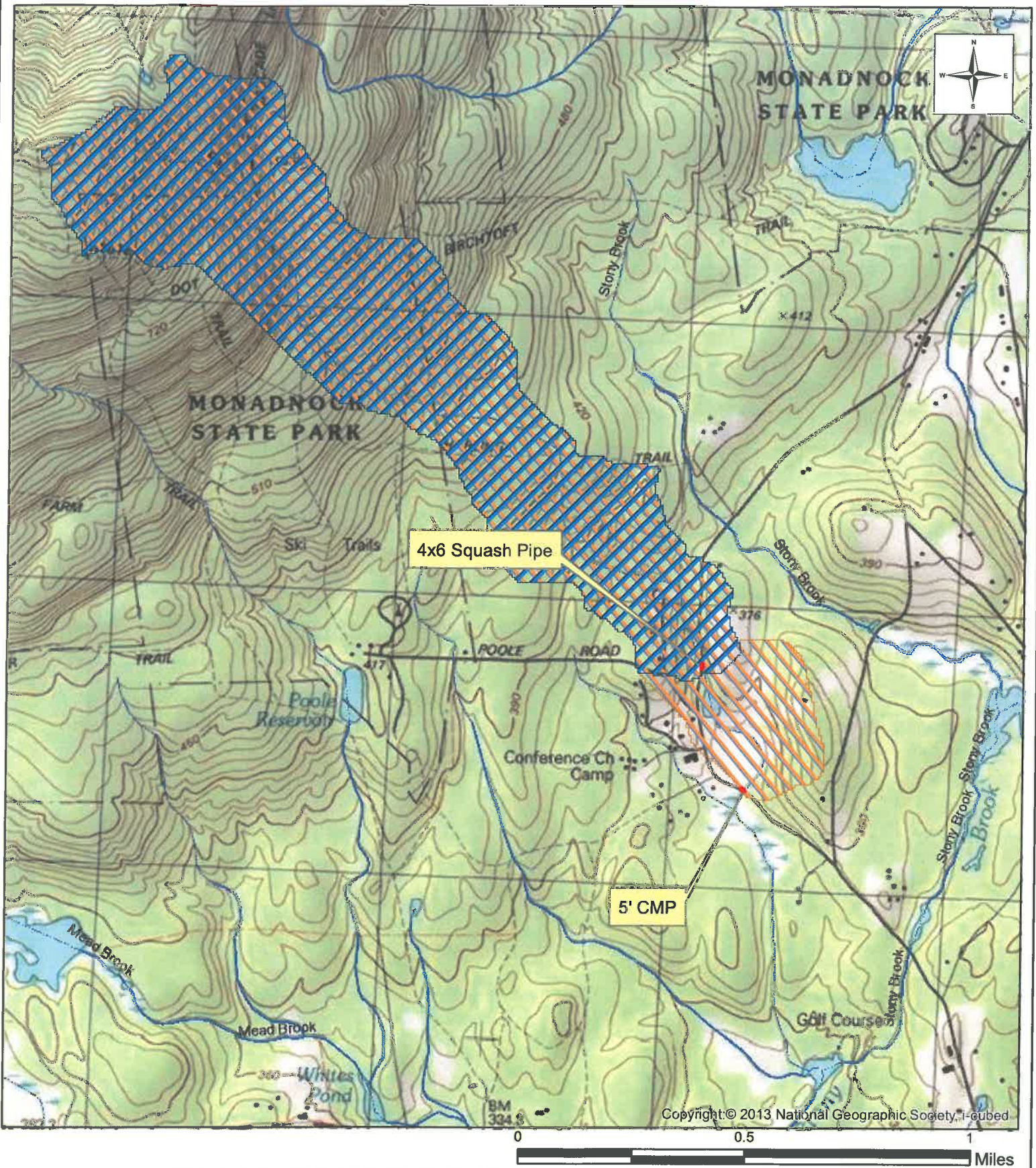
Therefore, a total of 14 LF due to channel loss will be mitigated for through a one time in lieu fee payment of \$3,692.47 to the ARM fund.

Monitoring Plan:

NHDOT proposes to use photo documentation, channel and water depth measurements, and a brief narrative of the inlet and outlet of the 6' plastic pipe as the monitoring approach for three years after the replacement is complete.

*information taken from 8/30/2019 stream crossing assessment completed by S.Large and others.

Jaffrey, 2019-M412-1



StreamStats Report, Jaffrey 2019-M413-3

Region ID:
Workspace ID:
Clicked Point (Latitude, Longitude):
Time:

NH
NH20190805133402626000
42.84502, -72.07391
2019-08-05 09:34:19 -0400



Replacement of 4x6 squash pipe with 6' diameter plastic pipe

Basin Characteristics

| Parameter Code | Parameter Description | Value | Unit |
|----------------|---|-------|--------------|
| DRNAREA | Area that drains to a point on a stream | 0.58 | square miles |
| APRAVPRE | Mean April Precipitation | 4.37 | inches |
| WETLAND | Percentage of Wetlands | 0 | percent |
| CSL10_85 | Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known | 819 | feet per mi |

Peak-Flow Statistics Parameters[Peak Flow Statewide SIR2008 5206]

| Parameter Code | Parameter Name | Value | Units | Min Limit | Max Limit |
|----------------|-------------------------------|-------|--------------|-----------|-----------|
| DRNAREA | Drainage Area | 0.58 | square miles | 0.7 | 1290 |
| APRAVPRE | Mean April Precipitation | 4.37 | inches | 2.79 | 6.23 |
| WETLAND | Percent Wetlands | 0 | percent | 0 | 21.8 |
| CSL10_85 | Stream Slope 10 and 85 Method | 819 | feet per mi | 5.43 | 543 |

Peak-Flow Statistics Disclaimers[Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report[Peak Flow Statewide SIR2008 5206]

| Statistic | Value | Unit |
|--------------------|-------|--------------------|
| 2 Year Peak Flood | 55.8 | ft ³ /s |
| 5 Year Peak Flood | 103 | ft ³ /s |
| 10 Year Peak Flood | 144 | ft ³ /s |
| 25 Year Peak Flood | 203 | ft ³ /s |

| Statistic | Value | Unit |
|---------------------|-------|--------------------|
| 50 Year Peak Flood | 252 | ft ³ /s |
| 100 Year Peak Flood | 311 | ft ³ /s |
| 500 Year Peak Flood | 457 | ft ³ /s |

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S. Geological Survey Scientific Investigations Report 2008-5206, 57 p. (<http://pubs.usgs.gov/sir/2008/5206/>)

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

USGS Software Disclaimer: This software has been approved for release by the U.S. Geological Survey (USGS). Although the software has been subjected to rigorous review, the USGS reserves the right to update the software as needed pursuant to further analysis and review. No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the software and related material nor shall the fact of release constitute any such warranty. Furthermore, the software is released on condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use.

USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.3.8

StreamStats Report, Jaffrey 2019-M413-3

Region ID:

NH

Workspace ID:

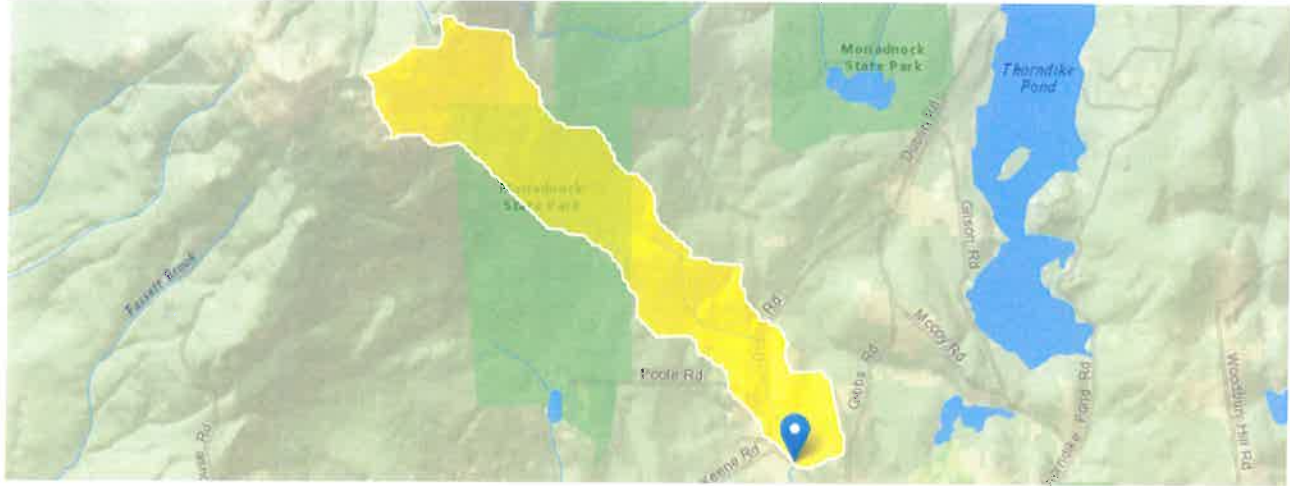
NH20190805132455408000

Clicked Point (Latitude, Longitude):

42.84129, -72.07203

Time:

2019-08-05 09:25:11 -0400



Replacement of 5' CMP with new 5' plastic pipe

Basin Characteristics

| Parameter Code | Parameter Description | Value | Unit |
|----------------|---|--------|--------------|
| DRNAREA | Area that drains to a point on a stream | 0.66 | square miles |
| APRAVPRE | Mean April Precipitation | 4.339 | inches |
| WETLAND | Percentage of Wetlands | 0.3313 | percent |
| CSL10_85 | Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known | 684 | feet per mi |

Peak-Flow Statistics Parameters[Peak Flow Statewide SIR2008 5206]

| Parameter Code | Parameter Name | Value | Units | Min Limit | Max Limit |
|----------------|-------------------------------|--------|--------------|-----------|-----------|
| DRNAREA | Drainage Area | 0.66 | square miles | 0.7 | 1290 |
| APRAVPRE | Mean April Precipitation | 4.339 | inches | 2.79 | 6.23 |
| WETLAND | Percent Wetlands | 0.3313 | percent | 0 | 21.8 |
| CSL10_85 | Stream Slope 10 and 85 Method | 684 | feet per mi | 5.43 | 543 |

Peak-Flow Statistics Disclaimers[Peak Flow Statewide SIR2008 5206]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report[Peak Flow Statewide SIR2008 5206]

| Statistic | Value | Unit |
|--------------------|-------|--------------------|
| 2 Year Peak Flood | 59.1 | ft ³ /s |
| 5 Year Peak Flood | 108 | ft ³ /s |
| 10 Year Peak Flood | 152 | ft ³ /s |
| 25 Year Peak Flood | 212 | ft ³ /s |

| Statistic | Value | Unit |
|---------------------|-------|--------------------|
| 50 Year Peak Flood | 263 | ft ³ /s |
| 100 Year Peak Flood | 325 | ft ³ /s |
| 500 Year Peak Flood | 476 | ft ³ /s |

Peak-Flow Statistics Citations

Olson, S.A., 2009, Estimation of flood discharges at selected recurrence intervals for streams in New Hampshire: U.S. Geological Survey Scientific Investigations Report 2008-5206, 57 p. (<http://pubs.usgs.gov/sir/2008/5206/>)

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

USGS Software Disclaimer: This software has been approved for release by the U.S. Geological Survey (USGS). Although the software has been subjected to rigorous review, the USGS reserves the right to update the software as needed pursuant to further analysis and review. No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the software and related material nor shall the fact of release constitute any such warranty. Furthermore, the software is released on condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use.

USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.3.8

Jaffrey Dublin Road Drainage Analysis Summary

4'x6' squash pipe upsized to 6' Plastic, Elevation of Road = Inlet side 198.4. Roadside ditch approximate elevation = 198

Streamstats Data

Q25 = 200 cfm

Q50 = 249 cfm

Q100 = 308 cfm

HY-8 Results

At the 25 year storm the proposed pipe will handle the flow and water will be below the edge of pavement elevation. At the 50 year storm the proposed pipe will handle the flow and water will be below the edge of pavement elevation. At the 100 year storm the proposed pipe will handle the flow without overtopping but the water elevation at the inlet will have risen to a level higher than the roadside ditch to the west and water will begin to flow down the ditch line to the west as the pipe takes the bulk of the flow. The upsized pipe and drainage ditch will pass the storm volume. The capacity of the new pipe is greater than the existing squash pipe, and will be better able to pass debris which has caused a flooding issue at this location in the past.

5' CMP changed to a 5' plastic pipe, Elevation of Road = 100.71 at Inlet side

Streamstats Data

Q25 = 212 cfm

Q50 = 263 cfm

Q100 = 325 cfm

HY-8 Results

At the 25 year storm the proposed pipe will handle the flow and the water elevation will just begin to crest the roadway elevation. The analysis indicates that for the 50 and 100 year events the road is breached, with a maximum water depth of 0.32' or 3.84" flowing over the road during the 100 year storm. We are unaware of this pipe ever overtopping the road or having flooding issues. Some of the difference between HY8 and historical data may be that the HY-8 program does not account for the storage capacity in the flat topography above the existing pipe. Due to no past history of flooding our design proposes the same size pipe replacement. With limited cover a larger pipe would have to be set with the invert below the existing pipe and may infill over time limiting any capacity increase that may be gained with the larger size. We also feel that if the road is breached the flat topography will mean no damage will be done

to the highway structure and no safety hazard will occur as the stream will avulses immediately over the road and enter the stream channel and adjacent forested wetland at the outlet. We feel overtopping during the 50 and 100 year events is acceptable though we do not anticipate it knowing the past history.

Developed by:
Kevin Belanger, PE
NHDOT

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: 5' Pipe Dublin Rd

| Headwater Elevation (ft) | Total Discharge (cfs) | Culvert 1 Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|--------------------------|-----------------------|---------------------------|-------------------------|-------------|
| 93.00 | 0.00 | 0.00 | 0.00 | 1 |
| 95.17 | 32.50 | 32.50 | 0.00 | 1 |
| 96.28 | 65.00 | 65.00 | 0.00 | 1 |
| 97.22 | 97.50 | 97.50 | 0.00 | 1 |
| 98.10 | 130.00 | 130.00 | 0.00 | 1 |
| 99.08 | 162.50 | 162.50 | 0.00 | 1 |
| 100.24 | 195.00 | 195.00 | 0.00 | 1 |
| 100.75 | 212.00 | 207.54 | 4.16 | 24 |
| 100.90 | 260.00 | 211.13 | 48.55 | 6 |
| 100.97 | 292.50 | 212.80 | 79.16 | 4 |
| 101.03 | 325.00 | 214.28 | 110.49 | 4 |
| 100.71 | 206.65 | 206.65 | 0.00 | Overtopping |

HY-8 Analysis Results

Crossing Summary Table

Culvert Crossing: 6' Dublin to replace Squash

| Headwater Elevation (ft) | Total Discharge (cfs) | Culvert 1 Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|--------------------------|-----------------------|---------------------------|-------------------------|-------------|
| 190.00 | 0.00 | 0.00 | 0.00 | 1 |
| 191.98 | 30.80 | 30.80 | 0.00 | 1 |
| 192.86 | 61.60 | 61.60 | 0.00 | 1 |
| 193.68 | 92.40 | 92.40 | 0.00 | 1 |
| 194.40 | 123.20 | 123.20 | 0.00 | 1 |
| 195.05 | 154.00 | 154.00 | 0.00 | 1 |
| 195.68 | 184.80 | 184.80 | 0.00 | 1 |
| 196.00 | 200.00 | 200.00 | 0.00 | 1 |
| 197.04 | 246.40 | 246.40 | 0.00 | 1 |
| 197.82 | 277.20 | 277.20 | 0.00 | 1 |
| 198.68 | 308.00 | 308.00 | 0.00 | 1 |
| 198.73 | 309.54 | 309.54 | 0.00 | Overtopping |

**NH Department of Transportation
District 4
Project, #2019-M412-1
Env-Wt 904.09 Alternative Design
TECHNICAL REPORT**

Env-Wt 904.09(a) - If the applicant believes that installing the structure specified in the applicable rule is not practicable, the applicant may propose an alternative design in accordance with this section.

Please explain why the structure specified in the applicable rule is not practicable (Env-Wt 101.69 defines practicable as *available and capable of being done after taking into consideration costs, existing technology, and logistics in light of overall project purposes.*)

Based on StreamStats calculations both crossings are tier 2 crossings. A compliant span structure, based on field bank full width calculations, is not practicable primarily due to budget and constructability constraints. This project is state funded and will be installed using state District staff and equipment. Limited state funds for this project make installation of a fully compliant structure not feasible. The proposed pipe is cost effective and can be installed using State equipment and District maintenance staff. The proposed design will continue to transport water while allowing for safe travel of the public.

The proposed alternative meets the specific design criteria for Tier 2 and Tier 3 crossings to the maximum extent practicable, as specified below.

Env-Wt 904.05 Design Criteria for Tier 2 and Tier 3 Stream Crossings – New Tier 2 stream crossings, replacement Tier 2 crossings that do not meet the requirements of Env-Wt 904.07, and new and replacement Tier 3 crossings shall be designed and constructed:

(a) In accordance with the NH Stream Crossing Guidelines.

The proposed improvements have been developed in accordance with the NH Stream Crossing Guidelines. The Department has considered design alternatives based on the general considerations that take the geomorphic conditions of the stream into account as it relates to the structure. The Department has collected data from the field and in the office to aid in the design of the proposed crossing. Using information that was available, the Department has determined that a compliant span bridge would not be practical. As such, the Department has proposed and alternate design that meets the intent of the stream crossing guidelines to the maximum extent possible. All work will use BMP's for Erosion and Sediment control.

(b) With bed forms and streambed characteristics necessary to cause water depths and velocities within the crossing structure at a variety of flows to be comparable to those found in the natural channel upstream and downstream of the stream crossing.

The proposed changes to both crossings will not change the water depths nor velocities within the crossing significantly.

The proposed project will have a minimal impact on the existing streambed material. Both crossings are currently corrugated metal, and both replacements will be plastic. The 4'X6' Squash CMP site will regrade the existing streambed upstream of the inlet to meet the grade of the new culvert and address the

accumulation of material within the channel. The pipe will also be extended, eliminating the perch at the outlet which will have an overall positive effect on the crossing. The 5' CMP will be at the same size and grade as exists today and will have minimal effect on the streambed as exists today. The work will minimally alter the stream crossing with negligible impact to wildlife passage, while restoring the roadway shoulder and reducing sedimentation.

(c) To provide a vegetated bank on both sides of the watercourse to allow for wildlife passage. Impacts to bank will be limited to culvert extension at both the inlets and outlets to allow for additional road shoulder to increase safety for the traveling public.

The existing crossing does not have banks through the pipe, nor will it after the replacement. Wildlife can pass through the pipe, although it will be in an aquatic environment. The bottom of the smooth structure will be roughened to help wildlife more easily pass through the pipe.

(d) To preserve the natural alignment and gradient of the stream channel, so as to accommodate natural flow regimes and the functioning of the natural floodplain.

The proposed replacement will not alter the alignment or gradient from the existing crossing. Flow regimes will remain as they do today. The proposed 6' crossing will have a 1.1% gradient (1.1% existing) and the 6' crossing will have a 0.6% gradient (0.5% existing).

(e) To accommodate the 100-year frequency flood, to ensure that (1) there is no increase in flood stages on abutting properties; and (2) flow and sediment transport characteristics will not be affected in a manner which could adversely affect channel stability.

According to the drainage analysis at the 100-year flood frequency the 6' plastic pipe replacement will have risen higher than the roadside ditch and water will begin to flow down the ditch line to the west as the pipe takes the bulk of the flow. The crossing has a history of overtopping from debris catchment blocking flow capacity and will be upsized to accommodate debris passage during storm events. The drainage analysis for the 5' plastic pipe determined at the 50 and 100-year storm event water will overtop the road, although the crossing does not have a history of flooding. It is presumed the wet meadow upstream of the crossing accommodates flood storage during storm events and will continue to after the proposed replacement.

(f) To simulate a natural stream channel.

The existing structures do not have natural streambed material, nor will the replacement pipes. The proposed pipe is in the same alignment therefore is no change to the stream channel from their existing conditions.

(g) So as not to alter sediment transport competence.

The proposed replacement will not impact the crossing's ability to transport sediment. Flow rates will be slightly increased due to roughened plastic pipe in the 6' crossing, while the 5' crossing will remain the same as it does today.

Env-Wt 904.09(c)(3) – The alternative design must meet the general design criteria specified in Env-Wt 904.01:

(a) Not be a barrier to sediment transport;

The proposed crossings will not be a barrier to sediment transport. The crossing will maintain the existing opening and therefore will continue to pass sediment as it does today.

(b) Prevent the restriction of high flows and maintain existing low flows;

The proposed project will not further restrict high and low flows as the crossing size will either maintain the existing size or be upside to further pass debris.

(c) Not obstruct or otherwise substantially disrupt the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction;

Aquatic life indigenous to the water body will not be obstructed or otherwise disrupted as a result of this project. The stream will maintain its ability to successfully provide adequate aquatic organism and fish passage. Fish & Game requested at the 11/20/2019 natural resource agency meeting to roughen the smooth plastic pipe. NHDOT will implement this recommendation.

(d) Not cause an increase in the frequency of flooding or overtopping of banks;

The existing crossing has no history of flooding or overtopping the banks of the stream. The proposed project will not increase the frequency of flooding or overtopping of banks.

(e) Preserve watercourse connectivity where it currently exists;

The squash pipe is not currently connected due to a perch at the outlet. The 5' pipe is currently connected and due to the low grade and surrounding landscape the crossing is currently connected and continues to hold water year-round.

(f) Restore watercourse connectivity where: (1) Connectivity previously was disrupted as a result of human activity(ies); and (2) Restoration of connectivity will benefit aquatic life upstream or downstream of the crossing, or both;

The extension of the squash pipe at the outlet will eliminate the perch and address the perch and scour pool at the outlet. The regrading at the inlet is to restore the channel and remove past aggradation. The upsized pipe intends to increase flow capacity and reduce the potential for aggradation. There will be no change connectivity in the 5' crossing.

(g) Not cause erosion, aggradation, or scouring upstream or downstream of the crossing; and

The intent of the proposed project will not cause erosion, aggradation or scouring upstream or downstream of the crossing. Appropriate BMP's will be in place to ensure that the construction site is stable at all times.

(h) Not cause water quality degradation.

The proposed project will not cause water quality degradation. BMP's/water diversion will be used to do work in a confined area. Stormwater will continue to drain in the river as it currently does today because no topography will be permanently altered.

*****Note: An alternative design for Tier 1 stream crossings must meet the general design criteria (Env-Wt 904.01) only to the *maximum extent practicable*.**

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project Jaffrey Location of Crossing _____ Date of field assessment 8/30/2019
2019-M412-1

Stream Parameters at Crossing

Existing Crossing (type and size): 4'x6' Squash Watershed size T2 371 ac

☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____

General Information to be collected at the Crossing:

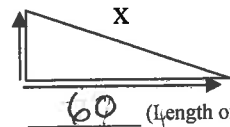
GPS Wetland Delineation: ☒ YES ☐ NO

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): absent, low density, moderate density, high density

Type of dominant vegetation (circle): graminoid, herbaceous, shrub/sapling, tree

Dominant Species:
Beech
white pine
Birch-Paper

Slope at crossing: 1% (Rise in Elev.) 0.7


out = 11.7 - 5 = 6.7
IN = 11.0 - 5 = 6

Outlet Data:

Depth of water at invert if not perched: N/A (example): 

Perched at outlet? ☒ YES ☐ NO (If yes, Distance from invert to the waters surface: 0.9') (example): 

Tailwater Controls present at crossing? ☒ YES ☐ NO

Pool Configuration: width 10.4 length: 25.4 Max pool depth at outlet: 1.5'

Location (distance from outlet): 8' Materials: cobble/Boulder/gravel + sand

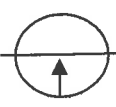
Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock
 Pebble Count: ☒ YES ☐ NO (Collect Data on Pg. 2)

☒ Photo of Outlet Structure

☒ Photo of Downstream Conditions

☒ Outlet Cross Section (Use Pg. 3 to collect Data)

Inlet Data:

Depth of water at inlet: 0.4' (example): 

Dominant Channel Material (visual assessment): ☒ sand ☐ silt ☒ gravel ☒ cobble ☒ boulder ☐ bedrock
 Pebble Count: ☐ YES ☒ NO (Collect Data on Pg. 2)

60% Gravel 20% cobble
20% Sand

☒ Photo of Inlet Structure

☒ Photo of Upstream Conditions

☒ Inlet Cross Section (Use Pg. 4 to collect Data)

Project _____ Location of Crossing _____ Date of field assessment _____

(Check Box Tally)

| (Check Box Only) | | |
|-------------------------|------------------------|--------------------------|
| Substrate Material | Upstream from crossing | Downstream from crossing |
| Sand (<0.007') | | |
| Gravel (0.007'-0.21') | | |
| Cobble (0.22' - 0.83') | | |
| Boulder (0.92' - 13.3') | | |
| Bedrock (>13.3') | | |

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Outlet Cross Section:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|----------|
| 1 | 0.6 |
| 2 | 1.5 |
| 3 | 1.7 |
| 4 | 1.8 |
| 5 | 2.0 |
| 6 | 1.9 |
| 7 | 1.8 |
| 8 | 1.7 |
| 9 | Rock 1.3 |
| 10 | 1.5 |
| 11 | 1.3 |
| 12 | 1.2 |
| 13 | 1.2 |
| 14 | X 0.9 |
| 15 | 0.5 |
| 16 | 0.0 |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |

| | |
|----|--|
| 67 | |
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= 1.3'

Max water depth= 0.6

Ctr of structure@: 7'

Wbf = 16'

Flood Prone Width= 30.4'

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____

Location of Crossing _____

Date of field assessment _____

Inlet Cross Section:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|----------|
| 1 | 1.5 |
| 2 | 1.5 |
| 3 | 1.8 |
| 4 | 2.0 |
| 5 | 1.9 |
| 6 | 1.8 |
| 7 | Rock 1.1 |
| 8 | 1.8 |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |

| | |
|----|--|
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= 1.675

Max water depth= 0.5'

Ctr of structure@: 4'

Wbf = 8.3

Flood Prone Width= 12.6'

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Reference Reach 1:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|-----|
| 1 | 0.5 |
| 2 | 0.5 |
| 3 | 0.5 |
| 4 | 0.5 |
| 5 | 0.6 |
| 6 | 0.6 |
| 7 | 0.9 |
| 8 | 0.7 |
| 9 | 1.0 |
| 10 | 0.7 |
| 11 | 0.9 |
| 12 | 0.6 |
| 13 | 1.0 |
| 14 | 1.0 |
| 15 | 1.0 |
| 16 | 1.0 |
| 17 | 0.9 |
| 18 | 0.5 |
| 19 | 0.1 |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |

| | |
|----|--|
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= 0.8'

Max water depth= 0.3

Ctr of structure@: N/A

Wbf= 19'

Flood Prone Width= 29'

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Reference Reach 2:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|-----|
| 1 | 0.2 |
| 2 | 0.2 |
| 3 | 0.7 |
| 4 | 0.8 |
| 5 | 1.2 |
| 6 | 1.0 |
| 7 | 1.1 |
| 8 | 1.0 |
| 9 | 0.8 |
| 10 | 0.7 |
| 11 | 0.7 |
| 12 | 0.5 |
| 13 | 0.5 |
| 14 | 0.4 |
| 15 | 0.5 |
| 16 | 0.5 |
| 17 | 0.6 |
| 18 | 0.9 |
| 19 | 1.2 |
| 20 | 1.4 |
| 21 | 1.4 |
| 22 | 1.4 |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |

| | |
|----|--|
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= 1.3'

Max water depth= 0.2

Ctr of structure@: N/A

Wbf = 22'

Flood Prone Width= 41'

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____

Location of Crossing _____

Date of field assessment _____

Reference Reach 3:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|-----|
| 1 | 1.2 |
| 2 | 1.5 |
| 3 | 1.7 |
| 4 | 2.1 |
| 5 | 2.3 |
| 6 | 2.3 |
| 7 | 2.4 |
| 8 | 2.4 |
| 9 | 1.8 |
| 10 | 1.5 |
| 11 | 1.7 |
| 12 | 1.5 |
| 13 | 1.3 |
| 14 | 0 |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |

| | |
|----|--|
| 30 | |
| 31 | |
| 32 | |
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |

| | |
|----|--|
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= 1.7
 Max water depth= 1.2
 Ctr of structure@: N/A
 Wbf = 14'
 Flood Prone Width= 25.3

40% Gravel
 40% Cobble
 10% Boulder
 10% Sand

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Reference Reach Pebble Counts: - measure at least 100 “pebbles” along a channel cross-section when possible (counts are usually done in riffles); measure the first “pebble” you touch at the end of your foot as you work your way across the channel; substrate is measured along the intermediate axis (neither the longest nor the shortest of the three perpendicular axes)

(Check Box Tally)

| (CHECK BOX FULLY) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Substrate Material | Ref 1 | | | | | | | | | | Ref 2 | | | | | | | | | | Ref 3 | | | | | | | | | | |
| Sand (<0.007’) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Gravel (0.007’-0.21’) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Cobble (0.22’- 0.83’) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| Boulder (0.92’ – 13.3’) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | | | | | | | | | | | |

visual
assessment
10% sand
40% gravel
40% cobble
10% Boulder

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Longitudinal Profile for Reference Reach (length = 7-10 times bankfull width)

Starting at Reference 1 going towards Reference 2:

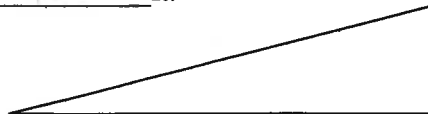
Shooting a pop level from at a height of: 5 ft.

Reading on survey rod at Ref 2: 4.4 ft.

A Difference of: 0.6 ft.

Distance between Ref 1 and Ref 2: 100 ft.

Slope at crossing: 0.6%



Depth of Water at Thalweg: _____ see cross section

(Features: Riffle, Run, Pool, Step, Glide)

| | | | | |
|-------------------------------|-------------|---|---------------|----|
| Features between Ref 1 and 2: | <u>Pool</u> | @ | <u>0-11</u> | ft |
| | <u>Step</u> | @ | <u>37-48</u> | ft |
| | <u>Step</u> | @ | <u>68</u> | ft |
| | <u>Step</u> | @ | <u>81</u> | ft |
| | <u>Pool</u> | @ | <u>90-100</u> | ft |
| | | @ | | ft |

From Reference 2 going towards Reference 3:

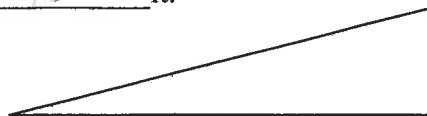
Shooting a pop level from at a height of: 5.6 ft.

Reading on survey rod at Ref 2: 4.9 ft.

A Difference of: 0.7 ft.

Distance between Ref 1 and Ref 2: 100 ft.

Slope at crossing: 0.7%



Depth of Water at Thalweg: _____ see cross section

(Features: Riffle, Run, Pool, Step, Glide)

| | | | | |
|-------------------------------|----------------|---|-----------|----|
| Features between Ref 1 and 2: | <u>log Jam</u> | @ | <u>50</u> | ft |
| | | @ | | ft |
| | | @ | | ft |
| | | @ | | ft |
| | | @ | | ft |
| | | @ | | ft |

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project Jaffrey, 2019-M413-3 Location of Crossing Dublin Road Date of field assessment 8/30/2019

Office Calculations for (At Crossing Data):

Entrenchment Ratio: $W_{fpa}/W_{bf} = \frac{[30.4 + 12.6]/2}{[(16 + 8.3)/2]}$

Width/Depth Ratio: $W_{bf}/\text{Average Depth} = \frac{18.3}{[(1.3 + 1.7)/2]}$

Sinuosity: stream length/valley length = $148 / 143 = 1.03$

Channel Slope: _____

Channel Material: _____

Rosgen Classification: _____

Office Calculations for (Reference Reach Data):

Entrenchment Ratio: $W_{fpa}/W_{bf} = \frac{25.3 + 41 + 29}{3} = 31.8 / \frac{14 + 22 + 19}{3} = 18.3 = 1.7$

Width/Depth Ratio: $W_{bf}/\text{Average Depth} = \frac{18.3}{\frac{1.7 + 1.3 + 0.8}{3}} = 14.1$

Sinuosity: stream length/valley length = $204 / 199 = 1.0$

Channel Slope: _____

Channel Material: _____

Rosgen Classification: _____

Avg W_{bf}

$$19 + 22 + 14 = \frac{55}{3} = 18.33 \quad (18.33 \times 1.2) + 2 \approx 24'$$

$$DA : 0.5296^{0.4892} \times 12.469 = (9.54 \times 1.2) + 2 \approx 13.45'$$

Project S' CMPLocation of Crossing Dublin RoadDate of field assessment 8/20/2019

Looks flat and equalizer pipe

Stream Parameters at CrossingExisting Crossing (type and size): S' CMPWatershed size 422 acre
0.66 sq mi
Tier 2☒ CMP ☐ RCP ☐ HDPE ☐ Arch/Squash Pipe ☐ Closed Box ☐ Open Box ☐ Bridge ☐ Other _____**General Information to be collected at the Crossing:**GPS Wetland Delineation: ☒ YES ☐ NO

Riparian Zone (surrounding or on the banks):

Extent of vegetation (circle): absent, low density, moderate density, high densityType of dominant vegetation (circle): graminoid, herbaceous, shrub/sapling, tree**Dominant Species:**Glossy Buckthorn
Grey Birch
Red Maple
grass spp.
wild sassafras
sensitive fernSlope at crossing: 10% (Rise in Elev.) 0.4
36' (Length of Crossing) 1-1'**Outlet Data:**Depth of water at invert if not perched: 1.3 (example): Perched at outlet? ☐ YES ☒ NO (If yes, Distance from invert to the waters surface: _____) (example): Tailwater Controls present at crossing? ☐ YES ☒ NOPool Configuration: width 13 length: 18' Max pool depth at outlet: 2.7'Location (distance from outlet): 15' Materials: silt w/ bouldersDominant Channel Material (visual assessment): ☒ sand ☒ silt ☐ gravel ☐ cobble ☒ boulder ☐ bedrockPebble Count: ☐ YES ☒ NO (Collect Data on Pg. 2)
99% sand/silt
1% boulder☒ Photo of Outlet Structure☒ Photo of Downstream Conditions☒ Outlet Cross Section (Use Pg. 3 to collect Data)**Inlet Data:**Depth of water at inlet: 1.1' (example): Dominant Channel Material (visual assessment): ☒ sand ☒ silt ☐ gravel ☐ cobble ☒ boulder ☐ bedrockPebble Count: ☐ YES ☒ NO (Collect Data on Pg. 2)☒ Photo of Inlet Structure☒ Photo of Upstream Conditions☒ Inlet Cross Section (Use Pg. 4 to collect Data)Glossy Buckthorn
Pine, Maple95% Sand/silt
5% Boulderout = 10.7 - 5 = 5.7
in = 10.3 - 5 = 5.3 1 of 4

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Outlet Cross Section:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|----------|
| 1 | 2 |
| 2 | 3 |
| 3 | 3.2 |
| 4 | 3.8 |
| 5 | 4.1 |
| 6 | 4.3 |
| 7 | 4.3 |
| 8 | Rock 3.4 |
| 9 | Rock 3.0 |
| 10 | Rock 3.2 |
| 11 | Rock 3.1 |
| 12 | 1.9 |
| 13 | 1.5 |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |

| | |
|----|--|
| 67 | |
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf = ~~8.6~~ 3.14

Max water depth = 2.6

Ctr of structure @: 7'

Wbf = 13.6

Flood Prone Width = ~~2.6~~

200+

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Inlet Cross Section:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|----------|
| 1 | 1.0 |
| 2 | 1.5 |
| 3 | 2.2 |
| 4 | 2.5 |
| 5 | 2.8 |
| 6 | 3.0 |
| 7 | 3.3 |
| 8 | 3.3 |
| 9 | 3.3 |
| 10 | 2.9 |
| 11 | 2.5 |
| 12 | Rock 1.8 |
| 13 | 1.5 |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |

| | |
|----|--|
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= ~~6.6~~ 2.4

Max water depth= 2.0

Ctr of structure@: 7'

Wbf = 13.3

Flood Prone Width= 200'

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Reference Reach 1:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|--------------------|
| 1 | 1.2 |
| 2 | 1.5 |
| 3 | 1.7 |
| 4 | 1.7 |
| 5 | 1.8 |
| 6 | 1.1 1.6 |
| 7 | 1.4 |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |

| | |
|----|--|
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= ~~3.6~~ 1.6

Max water depth= 0.7

Ctr of structure@: N/A

Wbf = 7.7

Flood Prone Width= 200 +

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Reference Reach 2:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|-----|
| 1 | 1.7 |
| 2 | 1.7 |
| 3 | 1.7 |
| 4 | 1.9 |
| 5 | 1.3 |
| 6 | 0.6 |
| 7 | |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |

| | |
|----|--|
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |

| | |
|----|--|
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= ~~3.8~~ 1.5'

Max water depth= 0.5'

Ctr of structure@:

Wbf = 6.3

Flood Prone Width= 200 +

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Reference Reach 3:

Starting bank (left/right)

| Dist. from bank (ft.) | Dbf |
|-----------------------|-----|
| 1 | 2.2 |
| 2 | 2.3 |
| 3 | 2.6 |
| 4 | 1.9 |
| 5 | 1.6 |
| 6 | 1.8 |
| 7 | 1.3 |
| 8 | 1.2 |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | |
| 16 | |
| 17 | |
| 18 | |
| 19 | |
| 20 | |
| 21 | |
| 22 | |
| 23 | |
| 24 | |
| 25 | |
| 26 | |
| 27 | |
| 28 | |
| 29 | |

| | |
|----|--|
| 30 | |
| 31 | |
| 32 | |
| 33 | |
| 34 | |
| 35 | |
| 36 | |
| 37 | |
| 38 | |
| 39 | |
| 40 | |
| 41 | |
| 42 | |
| 43 | |
| 44 | |
| 45 | |
| 46 | |
| 47 | |
| 48 | |
| 49 | |
| 50 | |
| 51 | |
| 52 | |
| 53 | |
| 54 | |
| 55 | |
| 56 | |
| 57 | |
| 58 | |
| 59 | |
| 60 | |

| | |
|----|--|
| 61 | |
| 62 | |
| 63 | |
| 64 | |
| 65 | |
| 66 | |
| 67 | |
| 68 | |
| 69 | |
| 70 | |
| 71 | |
| 72 | |
| 73 | |
| 74 | |
| 75 | |
| 76 | |
| 77 | |
| 78 | |
| 79 | |
| 80 | |
| 81 | |
| 82 | |
| 83 | |
| 84 | |
| 85 | |
| 86 | |
| 87 | |
| 88 | |
| 89 | |
| 90 | |

Avg Dbf= 1.9
 Max water depth= 1.1
 Ctr of structure@: 114
 Wbf= 8.4
 Flood Prone Width= 5.2

200+

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Longitudinal Profile for Reference Reach (length = 7-10 times bankfull width)

Starting at Reference 1 going towards Reference 2:

Shooting a pop level from at a height of: 5 ft.

Reading on survey rod at Ref 2: 5 ft.

A Difference of: 0 ft.

Distance between Ref 1 and Ref 2: 40 ft.

Slope at crossing: 0%



Depth of Water at Thalweg: 0.8

(Features: Riffle, Run, Pool, Step, Glide)

Features between Ref 1 and 2: Flat @ 0-40 ft
 _____ @ _____ ft
 _____ @ _____ ft
 _____ @ _____ ft
 _____ @ _____ ft
 _____ @ _____ ft

From Reference 2 going towards Reference 3:

Shooting a pop level from at a height of: 5.0 ft.

Reading on survey rod at Ref 2: 5.0 ft.

A Difference of: 0 ft.

Distance between Ref 1 and Ref 2: 40 ft.

Slope at crossing: 0%



Depth of Water at Thalweg: 1.0'

(Features: Riffle, Run, Pool, Step, Glide)

Features between Ref 1 and 2: Flat @ 0-40 ft
 _____ @ _____ ft
 _____ @ _____ ft
 _____ @ _____ ft
 _____ @ _____ ft
 _____ @ _____ ft

NHDOT STREAM CROSSING ASSESSMENT WORKSHEET

Project _____ Location of Crossing _____ Date of field assessment _____

Office Calculations for (At Crossing Data):

Entrenchment Ratio: Wfpa/Wbf = $200 / 13.45 = 14.9$

Width/Depth Ratio: Wbf/Average Depth = $13.45 / 2.77 = 4.9$

Sinuosity: stream length/valley length = $138 / 124 = 1.1$

Channel Slope: _____

Channel Material: silt/sand/organics

Rosgen Classification: _____

Office Calculations for (Reference Reach Data):

Entrenchment Ratio: Wfpa/Wbf = $200 / [(8.4 + 7.7 + 6.3) / 3] = 27$

Width/Depth Ratio: Wbf/Average Depth = $7.5 / [(1.6 + 1.5 + 1.9) / 3] = 4.4$

Sinuosity: stream length/valley length = $82 / 83 = 1$

Channel Slope: _____

Channel Material: silt/sand/organics

Rosgen Classification: _____

$$7.7 + 6.3 + 8.4 = \frac{22.4}{3} = 7.466 \text{ Average Wbf}$$

$$(7.5 \times 1.2) + 2 \approx 11'$$

DA

$$0.66 \times 12.466 = (10.175 \times 1.2) + 2 \approx 14'$$



NEW HAMPSHIRE NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

To: Arin Mills, NH Department of Transportation
John O. Morton Building
7 Hazen Drive
Concord, NH 03302-0483

From: NH Natural Heritage Bureau

Date: 8/15/2019 (valid for one year from this date)

Re: Review by NH Natural Heritage Bureau of request submitted 8/14/2019

NHB File ID: NHB19-2595

Applicant: Arin Mills

Location: Jaffrey
Dublin Rd

Project Description: Replacement of 2 large diameter pipes along Dublin Rd in Jaffrey that are showing signs of deterioration and in need of replacement. The proposed project is to replace 2 large diameter pipes, 1) 4x6 squash pipe which will be replaced with a 6' diameter pipe 2) 5' cmp to be replaced with a 5' plastic pipe.

The NH Natural Heritage database has been checked by staff of the NH Natural Heritage Bureau and/or the NH Nongame and Endangered Species Program for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government.

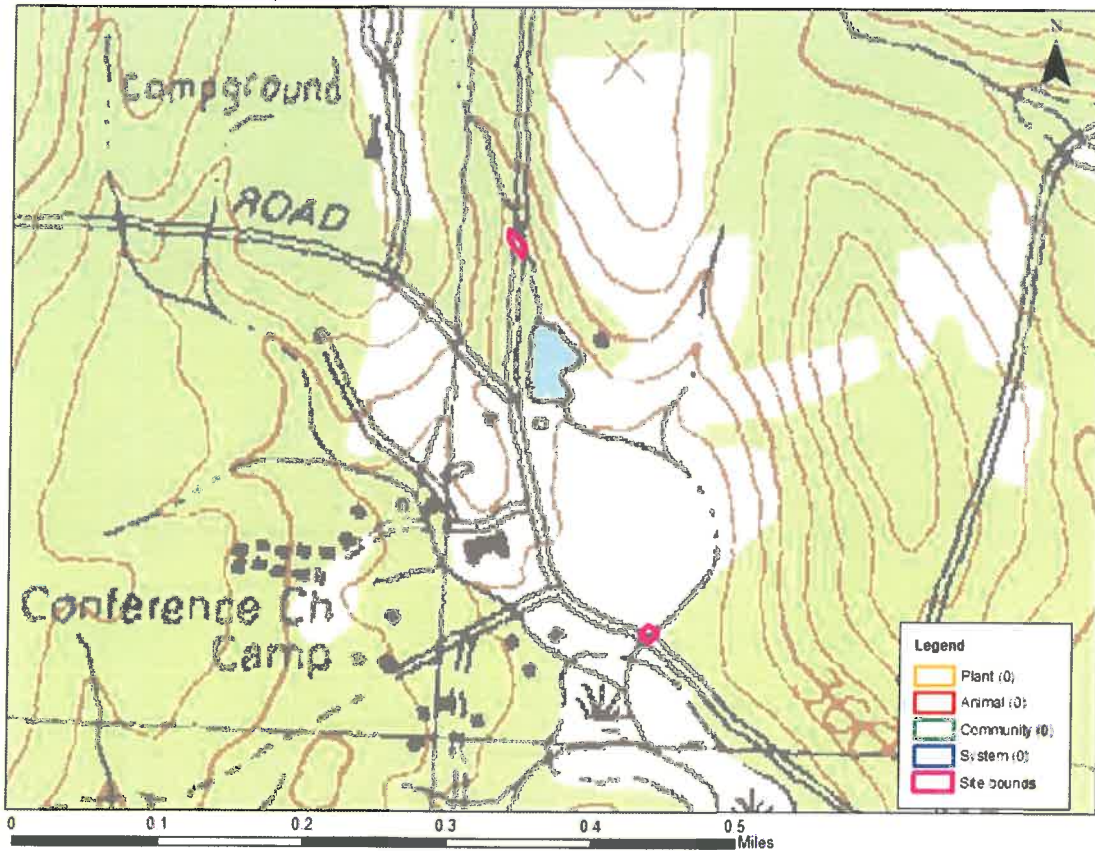
It was determined that, although there was a NHB record (e.g., rare wildlife, plant, and/or natural community) present in the vicinity, we do not expect that it will be impacted by the proposed project. This determination was made based on the project information submitted via the NHB Datacheck Tool on 8/14/2019, and cannot be used for any other project.



NEW HAMPSHIRE NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

MAP OF PROJECT BOUNDARIES FOR: NHB19-2595

NHB19-2595





United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>



In Reply Refer To:

August 22, 2019

Consultation Code: 05E1NE00-2019-SLI-2668

Event Code: 05E1NE00-2019-E-06927

Project Name: Jaffrey 2019-M413-3

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2019-SLI-2668

Event Code: 05E1NE00-2019-E-06927

Project Name: Jaffrey 2019-M413-3

Project Type: TRANSPORTATION

Project Description: Replace 2 large diameter pipes to address deterioration. Replace an existing 4 X 6 squash pipe on and existing 5' corrugated metal pipe on unnamed stream along Dublin Rd.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/42.84129939061209N72.07211918490705W>



Counties: Cheshire, NH

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME

STATUS

Northern Long-eared Bat *Myotis septentrionalis*

Threatened

No critical habitat has been designated for this species.

Species profile: <https://ecos.fws.gov/ecp/species/9045>

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
<http://www.fws.gov/newengland>

In Reply Refer To:

August 22, 2019

Consultation Code: 05E1NE00-2019-TA-2668

Event Code: 05E1NE00-2019-E-06928

Project Name: Jaffrey 2019-M413-3

Subject: Verification letter for the 'Jaffrey 2019-M413-3' project under the January 5, 2016, Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-eared Bat and Activities Excepted from Take Prohibitions.

Dear Arin Mills:

The U.S. Fish and Wildlife Service (Service) received on August 22, 2019 your effects determination for the 'Jaffrey 2019-M413-3' (the Action) using the northern long-eared bat (*Myotis septentrionalis*) key within the Information for Planning and Consultation (IPaC) system. This IPaC key assists users in determining whether a Federal action is consistent with the activities analyzed in the Service's January 5, 2016, Programmatic Biological Opinion (PBO). The PBO addresses activities excepted from "take"^[1] prohibitions applicable to the northern long-eared bat under the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based upon your IPaC submission, the Action is consistent with activities analyzed in the PBO. The Action may affect the northern long-eared bat; however, any take that may occur as a result of the Action is not prohibited under the ESA Section 4(d) rule adopted for this species at 50 CFR §17.40(o). Unless the Service advises you within 30 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the PBO satisfies and concludes your responsibilities for this Action under ESA Section 7(a)(2) with respect to the northern long-eared bat.

Please report to our office any changes to the information about the Action that you submitted in IPaC, the results of any bat surveys conducted in the Action area, and any dead, injured, or sick northern long-eared bats that are found during Action implementation. If the Action is not completed within one year of the date of this letter, you must update and resubmit the information required in the IPaC key.

If the Action may affect other federally listed species besides the northern long-eared bat, a proposed species, and/or designated critical habitat, additional consultation between you and this Service office is required. If the Action may disturb bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act is recommended.

[1]Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct [ESA Section 3(19)].

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

Jaffrey 2019-M413-3

2. Description

The following description was provided for the project 'Jaffrey 2019-M413-3':

Replace 2 large diameter pipes to address deterioration. Replace an existing 4 X 6 squash pipe on and existing 5' corrugated metal pipe on un-named stream along Dublin Rd.

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/42.84129939061209N72.07211918490705W>

**Determination Key Result**

This Federal Action may affect the northern long-eared bat in a manner consistent with the description of activities addressed by the Service's PBO dated January 5, 2016. Any taking that may occur incidental to this Action is not prohibited under the final 4(d) rule at 50 CFR §17.40(o). Therefore, the PBO satisfies your responsibilities for this Action under ESA Section 7(a)(2) relative to the northern long-eared bat.

Determination Key Description: Northern Long-eared Bat 4(d) Rule

This key was last updated in IPaC on May 15, 2017. Keys are subject to periodic revision.

This key is intended for actions that may affect the threatened northern long-eared bat.

The purpose of the key for Federal actions is to assist determinations as to whether proposed actions are consistent with those analyzed in the Service's PBO dated January 5, 2016.

Federal actions that may cause prohibited take of northern long-eared bats, affect ESA-listed species other than the northern long-eared bat, or affect any designated critical habitat, require ESA Section 7(a)(2) consultation in addition to the use of this key. Federal actions that may affect species proposed for listing or critical habitat proposed for designation may require a conference under ESA Section 7(a)(4).

Determination Key Result

This project may affect the threatened Northern long-eared bat; therefore, consultation with the Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.) is required. However, based on the information you provided, this project may rely on the Service's January 5, 2016, *Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions* to fulfill its Section 7(a)(2) consultation obligation.

Qualification Interview

1. Is the action authorized, funded, or being carried out by a Federal agency?

Yes

2. Have you determined that the proposed action will have "no effect" on the northern long-eared bat? (If you are unsure select "No")

No

3. Will your activity purposefully **Take** northern long-eared bats?

No

4. Is the project action area located wholly outside the White-nose Syndrome Zone?

Automatically answered

No

5. Have you contacted the appropriate agency to determine if your project is near a known hibernaculum or maternity roost tree?

Location information for northern long-eared bat hibernacula is generally kept in state Natural Heritage Inventory databases – the availability of this data varies state-by-state. Many states provide online access to their data, either directly by providing maps or by providing the opportunity to make a data request. In some cases, to protect those resources, access to the information may be limited. A web page with links to state Natural Heritage Inventory databases is available at www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

Yes

6. Will the action affect a cave or mine where northern long-eared bats are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment (physical or other alteration) of a hibernaculum?

No

7. Will the action involve Tree Removal?

Yes

8. Will the action only remove hazardous trees for the protection of human life or property?

No

9. Will the action remove trees within 0.25 miles of a known northern long-eared bat hibernaculum at any time of year?

No

10. Will the action remove a known occupied northern long-eared bat maternity roost tree or any trees within 150 feet of a known occupied maternity roost tree from June 1 through July 31?

No

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

0.1

2. If known, estimated acres of forest conversion from April 1 to October 31

0.1

3. If known, estimated acres of forest conversion from June 1 to July 31

0.1

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

If the project includes new wind turbines, report the megawatts of wind capacity below. Otherwise, type '0' in question 10.

10. What is the estimated wind capacity (in megawatts) of the new turbine(s)?

0

Proposed District Projects – NHDOT Cultural Resources Review

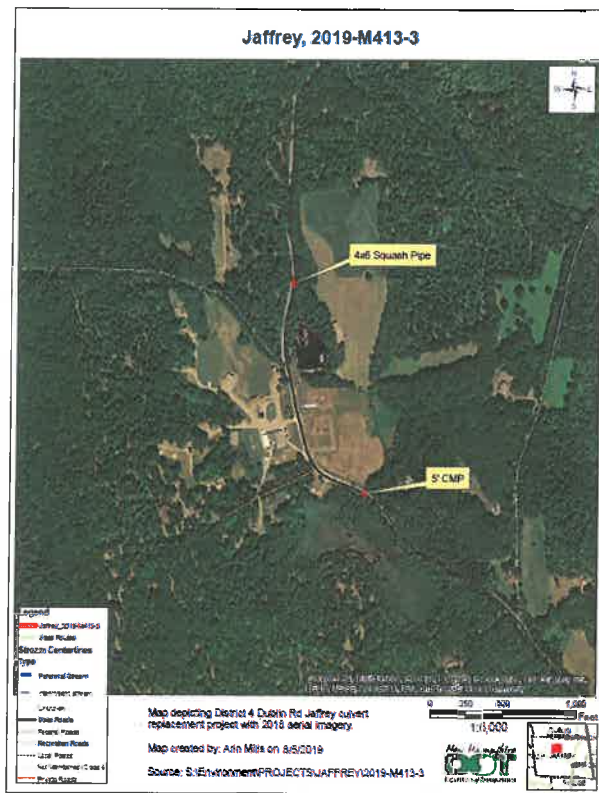
For the purpose of compliance with regulations of the National Historic Preservation Act, the Advisory Council on Historic Preservation's *Procedures for the Protection of Historic Properties* (36 CFR 800), the US Army Corps of Engineers' *Appendix C*, and/or state regulation RSA 227-C:9, *Directive for Cooperation in the Protection of Historic Resources*, the NHDOT Cultural Resources Program has reviewed the proposed project for potential impacts to historic properties and resources.

Proposed project:

The proposed project is a District 4 pipe replacement project along Dublin Rd east of Monadnock State Park in the town of Jaffrey. The project proposes to replace 2 large diameter pipes:

- 1) 4x6 squash pipe on Stoney Brook which will be replaced with a 6' diameter pipe
- 2) 5' CMP to be replaced with a 5' plastic pipe.

Both are showing deterioration and have been identified in need of replacement. The project will require a wetland permit from DES.



Above Ground Review – Squash Pipe M412-1 & CMP M412-1

Known/approximate age of structure: The ages of these cmp pipes are unknown.

- 1) 4' x 6' squash pipe which will be replaced with a 6' diameter pipe
- 2) 5' cmp (60 inches in diameter) to be replaced with a 5' plastic pipe.

EMMIT review on 8/23/2019 identified no listed historic properties or districts in or adjacent to the two culvert replacement locations.

☒ No Potential to Cause Effect/No Concerns

This finding of no concerns is based on:

- The squash pipe and corrugated metal pipe culverts are less than 50 years old
- The project remains within existing road alignments and has a limited footprint

If this were a federal project, proposed activities would comply with the Section 106 Programmatic Agreement undertakings of Appendix B Certification, activities with minimal potential to cause effects:

5. Culvert replacement (excluding stone box culverts), when the culvert is less than 60" in diameter and excavation for replacement is limited to previously disturbed areas

7. Non-historic bridge and culvert maintenance, renovation, or total replacement, that may require minor addition right-of-way or easement, ...

☐ Concerns:

Below Ground Review - Squash Pipe M412-1 & CMP M412-1

Recorded Archaeological site: ☐ Yes ☒ No

Nearest Recorded Archaeological Site Name & Number: 27-CH-0011 (no name)

☒ Pre-Contact ☐ Post-Contact

Distance from Project Area: 1.69 miles (2.7 KM) northeast of the northernmost pipe (squash pipe) situated adjacent to Thorndike Pond

☒ No Potential to Cause Effect/No Concerns

EMMIT review on 8/23/2019 did not disclose any archaeological sites in or directly adjacent to the project areas. No cemeteries are documented along this alignment as well.

This project does not involve the construction of a new highway, the addition of through traffic lanes or substantial alterations to either the vertical or horizontal alignment of the existing roadway. Due to the proposed undertakings which indicate impacts will be primarily confined to already disturbed soils and that the project does not propose any new areas of excavation, there are no archaeological concerns.

Summary review:

The project scope and USGS maps identifying project locations were reviewed by Cultural Resources Program Specialist/Archaeologist Sheila Charles and there are no concerns for cultural resources. If the scope of work changes or the Contractor proposes work in previously undisturbed areas, the Bureau of Environment will review the changes and reassess the findings prior to construction.

Reviewed by:

Sheila Charles

8/23/2019, 11/18/2019

NHDOT Cultural Resources Staff

Date:

Section 106 Programmatic Agreement – Cultural Resources Review Effect Finding

Appendix B Certification – Activities with Minimal Potential to Cause Effects

Date Reviewed: 11/18/2019

(Desktop or Field Review Date)

☒ This Project uses only State funding; however project activities listed below comply with the PA.

Project Name: Jaffrey Culvert Replacement

State Number: 2019-M412-1

FHWA Number: N/A

Environmental Contact: Arin Mills

DOT

Email Address: Arin.mills@dot.nh.gov

Project Manager: Kevin Belanger

Project Description: Replacement of 2 large diameter cmp pipes along Dublin Rd in Jaffrey that are showing signs of deterioration and in need of replacement. The proposed project is to replace 2 large diameter pipes, 1) 4'x6'x59' squash pipe which will be replaced with a 6' diameter x 70' long pipe 2) 5'x37' cmp to be replaced with a 5'x48' plastic pipe

Please select the applicable activity/activities:

| Highway and Roadway Improvements | |
|-------------------------------------|---|
| <input type="checkbox"/> | 1. Modernization and general highway maintenance <u>that may require additional highway right-of-way or easement</u> , including: Choose an item. Choose an item. |
| <input type="checkbox"/> | 2. Installation of rumble strips or rumble stripes |
| <input type="checkbox"/> | 3. Installation or replacement of pole-mounted signs |
| <input type="checkbox"/> | 4. Guardrail replacement, provided any extension does not connect to a bridge older than 50 years old (unless it does already), and there is no change in access associated with the extension |
| Bridge and Culvert Improvements | |
| <input checked="" type="checkbox"/> | 5. Culvert replacement (excluding stone box culverts), when the culvert is less than 60" in diameter and excavation for replacement is limited to previously disturbed areas |
| <input type="checkbox"/> | 6. Bridge deck preservation and replacement, as long as no character defining features are impacted |
| <input checked="" type="checkbox"/> | 7. Non-historic bridge and culvert maintenance, renovation, or total replacement, <u>that may require minor additional right-of-way or easement</u> , including: Choose an item. Choose an item. |
| <input type="checkbox"/> | 8. Historic bridge maintenance activities within the limits of existing right-of-way, including: Choose an item. Choose an item. |
| <input type="checkbox"/> | 9. Stream and/or slope stabilization and restoration activities (including removal of debris or sediment obstructing the natural waterway, or any non-invasive action to restore natural conditions) |
| Bicycle and Pedestrian Improvements | |
| <input type="checkbox"/> | 10. Construction of pedestrian walkways, sidewalks, sidewalk tip-downs, small passenger shelters, and alterations to facilities or vehicles in order to make them accessible for elderly and handicapped persons |
| <input type="checkbox"/> | 11. Installation of bicycle racks |
| <input type="checkbox"/> | 12. Recreational trail construction |
| <input type="checkbox"/> | 13. Recreational trail maintenance when done on existing alignment |
| <input type="checkbox"/> | 14. Construction of bicycle lanes and shared use paths and facilities within the existing right-of-way |
| Railroad Improvements | |
| <input type="checkbox"/> | 15. Modernization, maintenance, and safety improvements of railroad facilities within the existing railroad or highway right-of-way, <u>provided no historic railroad features are impacted</u> , including, but not limited to: Choose an item. |

Section 106 Programmatic Agreement – Cultural Resources Review Effect Finding

Appendix B Certification – Activities with Minimal Potential to Cause Effects

| | |
|---------------------------|--|
| | Choose an item. |
| <input type="checkbox"/> | 16. In-kind replacement of modern railroad features (i.e. those features that are less than 50 years old) |
| <input type="checkbox"/> | 17. Modernization/modification of railroad/roadway crossings provided that all work is undertaken within the limits of the roadway structure (edge of roadway fill to edge of roadway fill) and no associated character defining features are impacted |
| Other Improvements | |
| <input type="checkbox"/> | 18. Installation of Intelligent Transportation Systems |
| <input type="checkbox"/> | 19. Acquisition or renewal of scenic, conservation, habitat, or other land preservation easements where no construction will occur |
| <input type="checkbox"/> | 20. Rehabilitation or replacement of existing storm drains. |
| <input type="checkbox"/> | 21. Maintenance of stormwater treatment features and related infrastructure |

Please describe how this project is applicable under Appendix B of the Programmatic Agreement.


CMP Culvert replacement will require excavation limited to previously disturbed areas.

Please submit this Certification Form along with the Transportation RPR, including photographs, USGS maps, design plans and as-built plans, if available, for review. Note: The RPR can be waived for in-house projects, please consult Cultural Resources Program Staff.

Coordination Efforts:

| | | | |
|---|-------------------------------------|-----------------------|---|
| Has an RPR been submitted to NHDOT for this project? | Not Applicable | NHDHR R&C # assigned? | Click here to enter text. |
| | | | |
| Please identify public outreach effort contacts; method of outreach and date: | <u>All actions within NHDOT ROW</u> | | |

Finding: (To be filled out by NHDOT Cultural Resources Staff)

| | | | |
|--|--|--------------------------|---------------------------------|
| <input checked="" type="checkbox"/> | No Potential to Cause Effects | <input type="checkbox"/> | No Historic Properties Affected |
| This finding serves as the Section 106 Memorandum of Effect. No further coordination is necessary. | | | |
| <input type="checkbox"/> | This project does <i>not</i> comply with Appendix B. Review will continue under Stipulation VII of the Programmatic Agreement. Please contact NHDOT Cultural Resources Staff to determine next steps. | | |
| <p>NHDOT comments:</p> <div style="display: flex; justify-content: space-between; align-items: flex-end; margin-top: 50px;"> <div style="text-align: center;">  _____ NHDOT Cultural Resources Staff </div> <div style="text-align: center;"> 11/18/2019 _____ Date </div> </div> | | | |

Coordination of the Section 106 process should begin as early as possible in the planning phase of the project (undertaking) so as not to cause a delay.

Section 106 Programmatic Agreement – Cultural Resources Review Effect Finding

Appendix B Certification – Activities with Minimal Potential to Cause Effects

Project sponsors should not predetermine a Section 106 finding under the assumption a project is limited to the activities listed in Appendix B until this form is signed by the NHDOT Bureau of Environment Cultural Resources Program staff.

Every project shall be coordinated with, and reviewed by the NHDOT-BOE Cultural Resources Program in accordance with the *Programmatic Agreement Among the Federal Highway Administration, the New Hampshire State Historic Preservation Office, the Army Corps of Engineers, New England District, the Advisory Council on Historic Preservation, and the New Hampshire Department of Transportation Regarding the Federal Aid Highway Program in New Hampshire*. In accordance with the Advisory Council's regulations, we will continue to consult, as appropriate, as this project proceeds.

NHDOT and the State Historic Preservation Office may use provisions of the Programmatic Agreement to address the applicable requirements of NH RSA 227-C:9 in the location, identification, evaluation and management of historic resources, for projects funded by State funds.

If any portion of the project is not entirely limited to any one or a combination of the activities specified in Appendix B (with, or without the inclusion of any activities listed in Appendix A), please continue discussions with NHDOT Cultural Resources staff.

This No Potential to Cause Effect or No Historic Properties Affected project determination is your Section 106 finding, as defined in the Programmatic Agreement.

Should project plans change, please inform the NHDOT Cultural Resources staff in accordance with Stipulation VII of the Programmatic Agreement.



**US Army Corps
of Engineers®**
New England District

Appendix B

**Regional General Permits (GPs)
Required Information and Corps Secondary Impacts Checklist**

In order for the Corps of Engineers to properly evaluate your application, applicants must submit the following information along with the New Hampshire DES Wetlands Bureau application or permit notification forms. Some projects may require more information. For a more comprehensive checklist, go to www.nae.usace.army.mil/regulatory, “Forms/Publications” and then “Application and Plan Guideline Checklist.” Check with the Corps at (978) 318-8832 for project-specific requirements. For your convenience, this Appendix B is also attached to the State of New Hampshire DES Wetlands Bureau application and Permit by Notification forms.

All Projects:

- Corps application form (**ENG Form 4345**) as appropriate.
- Photographs of wetland/waterway to be impacted.
- Purpose of the project.
- Legible, reproducible black and white (no color) plans no larger than 11”x17” with bar scale. Provide locus map and plan views of the entire property.
- Typical cross-section views of all wetland and waterway fill areas and wetland replication areas.
- In navigable waters, show mean low water (MLW) and mean high water (MHW) elevations. Show the high tide line (HTL) elevations when fill is involved. In other waters, show ordinary high water (OHW) elevation.
- On each plan, show the following for the project:
 - Vertical datum and the NAVD 1988 equivalent with the vertical units as U.S. feet. Don’t use local datum. In coastal waters this may be mean higher high water (MHHW), mean high water (MHW), mean low water (MLW), mean lower low water (MLLW) or other tidal datum with the vertical units as U.S. feet. MLLW and MHHW are preferred. Provide the correction factor detailing how the vertical datum (e.g., MLLW) was derived using the latest National Tidal Datum Epoch for that area, typically 1983-2001.
 - Horizontal state plane coordinates in U.S. survey feet based on the Traverse Mercator Grid system for the State of New Hampshire (Zone 2800) NAD 83.
- Show project limits with existing and proposed conditions.
- Limits of any Federal Navigation Project in the vicinity of the project area and horizontal State Plane Coordinates in U.S. survey feet for the limits of the proposed work closest to the Federal Navigation Project;
- Volume, type, and source of fill material to be discharged into waters and wetlands, including the area(s) (in square feet or acres) of fill in wetlands, below the ordinary high water in inland waters and below the high tide line in coastal waters.
- Delineation of all waterways and wetlands on the project site,:
- Use Federal delineation methods and include Corps wetland delineation data sheets. See GC 2 and www.nero.noaa.gov/hcd for eelgrass survey guidance.
- GP 3, Moorings, contains eelgrass survey requirements for the placement of moorings.
- For activities involving discharges of dredged or fill material into waters of the U.S., include a statement describing how impacts to waters of the U.S. are to be avoided and minimized, and either a statement describing how impacts to waters of the U.S. are to be compensated for (or a conceptual or detailed mitigation plan) or a statement explaining why compensatory mitigation should not be required for the proposed impacts. Please contact the Corps for guidance.



**US Army Corps
of Engineers®**
New England District

**New Hampshire General Permits (GPs)
Appendix B - Corps Secondary Impacts Checklist
(for inland wetland/waterway fill projects in New Hampshire)**

1. Attach any explanations to this checklist. Lack of information could delay a Corps permit determination.
2. All references to "work" include all work associated with the project construction and operation. Work includes filling, clearing, flooding, draining, excavation, dozing, stumping, etc.
3. See GC 5, regarding single and complete projects.
4. Contact the Corps at (978) 318-8832 with any questions.

| 1. Impaired Waters | Yes | No |
|---|------------|-----------|
| 1.1 Will any work occur within 1 mile upstream in the watershed of an impaired water? See http://des.nh.gov/organization/divisions/water/wmb/section401/impaired_waters.htm to determine if there is an impaired water in the vicinity of your work area.* | | X |
| 2. Wetlands | Yes | No |
| 2.1 Are there are streams, brooks, rivers, ponds, or lakes within 200 feet of any proposed work? | X | |
| 2.2 Are there proposed impacts to SAS, special wetlands. Applicants may obtain information from the NH Department of Resources and Economic Development Natural Heritage Bureau (NHB) DataCheck Tool for information about resources located on the property at https://www2.des.state.nh.us/nhb_datacheck/ . The book Natural Community Systems of New Hampshire also contains specific information about the natural communities found in NH. | | X |
| 2.3 If wetland crossings are proposed, are they adequately designed to maintain hydrology, sediment transport & wildlife passage? | X | |
| 2.4 Would the project remove part or all of a riparian buffer? (Riparian buffers are lands adjacent to streams where vegetation is strongly influenced by the presence of water. They are often thin lines of vegetation containing native grasses, flowers, shrubs and/or trees that line the stream banks. They are also called vegetated buffer zones.) | X | |
| 2.5 The overall project site is more than 40 acres? | | X |
| 2.6 What is the area of the previously filled wetlands? | | |
| 2.7 What is the area of the proposed fill in wetlands? | | |
| 2.8 What is the % of previously and proposed fill in wetlands to the overall project site? | | |
| 3. Wildlife | Yes | No |
| 3.1 Has the NHB & USFWS determined that there are known occurrences of rare species, exemplary natural communities, Federal and State threatened and endangered species and habitat, in the vicinity of the proposed project? (All projects require an NHB ID number & a USFWS IPAC determination.) NHB DataCheck Tool: https://www2.des.state.nh.us/nhb_datacheck/ USFWS IPAC website: https://ecos.fws.gov/ipac/location/index | | X |

| | | |
|--|-----------------|------------|
| 3.2 Would work occur in any area identified as either “Highest Ranked Habitat in N.H.” or “Highest Ranked Habitat in Ecological Region”? (These areas are colored magenta and green, respectively, on NH Fish and Game’s map, “2010 Highest Ranked Wildlife Habitat by Ecological Condition.”) Map information can be found at: • PDF: www.wildlife.state.nh.us/Wildlife/Wildlife_Plan/highest_ranking_habitat.htm . • Data Mapper: www.granit.unh.edu . • GIS: www.granit.unh.edu/data/downloadfreedata/category/databycategory.html . | | X |
| 3.3 Would the project impact more than 20 acres of an undeveloped land block (upland, wetland/waterway) on the entire project site and/or on an adjoining property(s)? | | X |
| 3.4 Does the project propose more than a 10-lot residential subdivision, or a commercial or industrial development? | | X |
| 3.5 Are stream crossings designed in accordance with the GC 21? | X | |
| 4. Flooding/Floodplain Values | Yes | No |
| 4.1 Is the proposed project within the 100-year floodplain of an adjacent river or stream? | | X |
| 4.2 If 4.1 is yes, will compensatory flood storage be provided if the project results in a loss of flood storage? | | N/A |
| 5. Historic/Archaeological Resources | | |
| For a minimum, minor or major impact project - a copy of the Request for Project Review (RPR) Form (www.nh.gov/nhdhr/review) with your DES file number shall be sent to the NH Division of Historical Resources as required on Page 11 GC 8(d) of the GP document** | Included | |

*Although this checklist utilizes state information, its submittal to the Corps is a Federal requirement.

** If your project is not within Federal jurisdiction, coordination with NH DHR is not required under Federal law.

2.4: A portion of the riparian buffer will be removed with the extension of both the inlet and outlet of each pipe. Both locations have existing rip-rap at inlet/outlet of the pipe. This extension is to improve safety and reduce sedimentation into the stream by widening the road shoulder. The area will be regraded and seeded.

Mills, Arin

From: Hicks, Michael C CIV USARMY CENAE (USA) <Michael.C.Hicks@usace.army.mil>
Sent: Thursday, November 21, 2019 3:56 PM
To: Mills, Arin
Subject: RE: Jaffrey 2019-M412-1 EFH Eval

EXTERNAL: Do not open attachments or click on links unless you recognize and trust the sender.

Arin,

You are correct, this is not an EFH resource. I got the Androscoggin River mixed up with the Merrimack River for the Stony Brook tributary. No need to coordinate with Mike Johnson. It was nice meeting you.

Thanks,
Mike

Michael Hicks, PM
USACE, REG DIV., BR. C
978-318-8157

-----Original Message-----

From: Mills, Arin [mailto:Arin.Mills@dot.nh.gov]
Sent: Thursday, November 21, 2019 8:50 AM
To: Hicks, Michael C CIV USARMY CENAE (USA) <Michael.C.Hicks@usace.army.mil>
Subject: [Non-DoD Source] Jaffrey 2019-M412-1 EFH Eval

Hello Mike, Thanks for all the great discussion at the NR meeting yesterday regarding the Jaffrey project. I wanted to follow-up on the EFH discussion to be sure I move in the right direction for this. I looked a bit further into the EFH list in Appendix D of the PGP and did confirm that the 'Stony Brook' listed in the Androscoggin River watershed is NOT the same waterbody as the Stony Brook this crossing drains to. This un-named tributary is in the Merrimack River watershed. The stream where this work will be done leads into Stony Brook (again, not the one listed in Appendix B) which further drains into Mountain Brook, which eventually leads into the Contookook River and eventually into the Merrimack. From the project location there are at least 3 impoundments (dams) before reaching the Contookook.

With this, I want to verify if you feel it is necessary for me to reach out to Mike Johnson for the EFH evaluation for this work?

Thanks again for your help!

Arin Mills

Environmental Manager, Operations Management

NH Department of Transportation

Bureau of Environment

7 Hazen Drive, Concord, NH 03302

Ph: (603)271-0187

Arin.mills@dot.nh.gov



Photo 1: Dublin Rd looking North



Photo 2: Dublin Rd looking South



Photo 3: Looking North (upstream) at outlet toward Dublin Rd



Photo 4: Looking South (downstream) at outlet from Dublin Rd



Photo 5: Looking South (downstream) toward Dublin Rd



Photo 6: Looking North (upstream) from Dublin Rd



Photo 7: Looking North (upstream) at outlet



Photo 8: Looking South (downstream) at inlet



Photo 1: Dublin Rd looking Northwest



Photo 2: Dublin Rd looking Southeast



Photo 3: Looking Northeast (upstream) at outlet toward Dublin Rd crossing



Photo 4: Looking Southwest (downstream) at outlet from Dublin Rd



Photo 5: Looking Southwest (downstream) toward Dublin Rd crossing



Photo 6: Looking Northeast (upstream) from Dublin Rd



Photo 7: Looking Southwest (downstream) from inlet



Photo 8: Looking Northeast (upstream) from outlet



Photo 9: Looking South– southeast (downstream) at forested wetland



Photo 10: Looking South- Southwest (downstream) at forested wetland



Photo 11: Looking Northeast (upstream) approx. 100' upstream of crossing



Photo 12: Looking North (upstream) at wet meadow from Dublin Rd

Jaffrey Dublin Road

Squash pipe replacement construction Sequence.

Day 1

- Install sandbag coffer dam upstream to stop flow. Install bypass pump and dewater into siltbag if flow high enough that bypass is required.
- Install other sediment control BMP's as needed.
- Remove guardrail as needed.
- Install outlet side of pipe. (east)
- Build headwall and backfill, construct fill slope as shown on plan.
- Shift traffic to the east.
- Install remainder of pipe.
- Build headwall, backfill pipe, and open to traffic.
- Remove sandbag coffer dam, install silt socks at toe of disturbed slopes.
- Place barrels or cones along existing roadway, as needed.

Day 2

- Finish cleanup of slopes. Loam seed and mulch slopes.
- Replace guardrail as needed.
- Remove perimeter sediment control measures once site is stabilized.

Notes.

Machinery will be placed on the existing road to access the work area. Access to the bank will be via foot traffic. Tree branches will be removed as needed to allow use of machinery surrounding the work area.

Jaffrey Dublin Road

5' pipe replacement construction Sequence.

Day 1

- Install sandbag coffer dam each side (upstream and downstream) and dewater into a siltbag.
- Install other sediment control BMP's as needed.
- Build temporary widening to the north to accommodate one lane of traffic.
- Install outlet side of pipe. (south)
- Build headwall and backfill, construct fill slope as shown on plan.
- Shift traffic to the south.
- Install remainder of pipe.
- Build headwall, backfill pipe, and open to traffic.
- Remove sandbag coffer dam and install silt socks at toe of disturbed slopes.

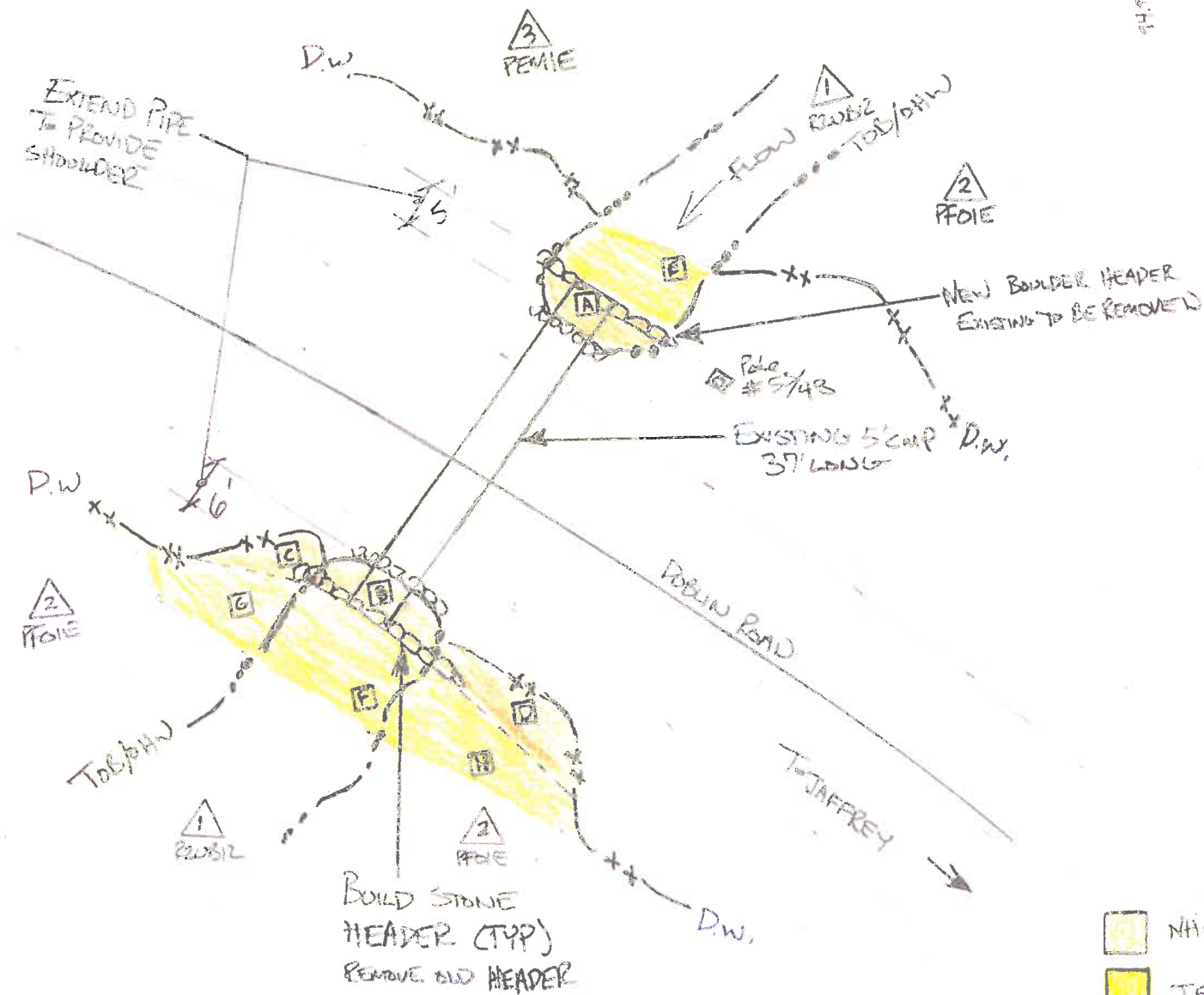
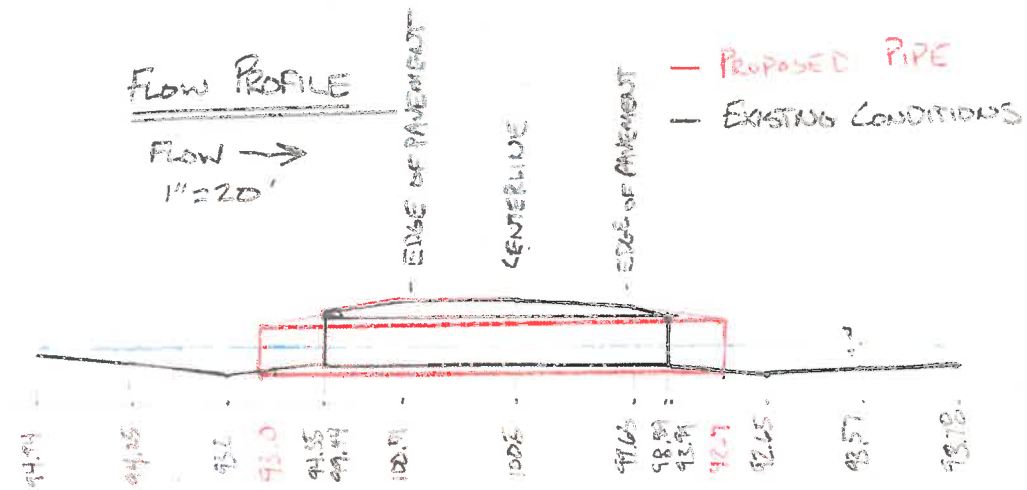
Day 2

- Finish cleanup of slopes. Loam seed and mulch slopes.
- Remove perimeter sediment control measures once site is stabilized.

JAFFREY DUBLIN ROAD

5' DIAMETER CMP TO 5' PLASTIC

NORTH



PLAN VIEW

1" = 20'

KEY

- NAWB: ALOE WETLAND PERMANENT
- TEMPORARY IMPACT
- WETLAND DESIGNATION
- WETLAND IMPACT LOCATION
- ~xx~ DELINEATED WETLAND
- ORDINARY HIGH WATER

JAFFREY, DUBLIN ROAD

4'x6' SQUASH PIPE TO
→ 6' PLASTIC

FLOW PROFILE

FLOW →
1"=20'

- PROPOSED PIPE

- EXISTING CONDITIONS

ELIMINATE
PERCH



NEW BOULDER HEADER
REMOVE OLD HEADER
EXTEND 3'

EXTENDING 4'x6'
SQUASH PIPE 59'

REPLACE WITH
6' PLASTIC 70'

REGRADE BED TO
MEET INVERT

NORTH

EXISTING CONC BLOCK
STONE HEADER

EXTEND 8'

NEW HEADER
USE BOULDERS & BLOCKS
FROM EXISTING

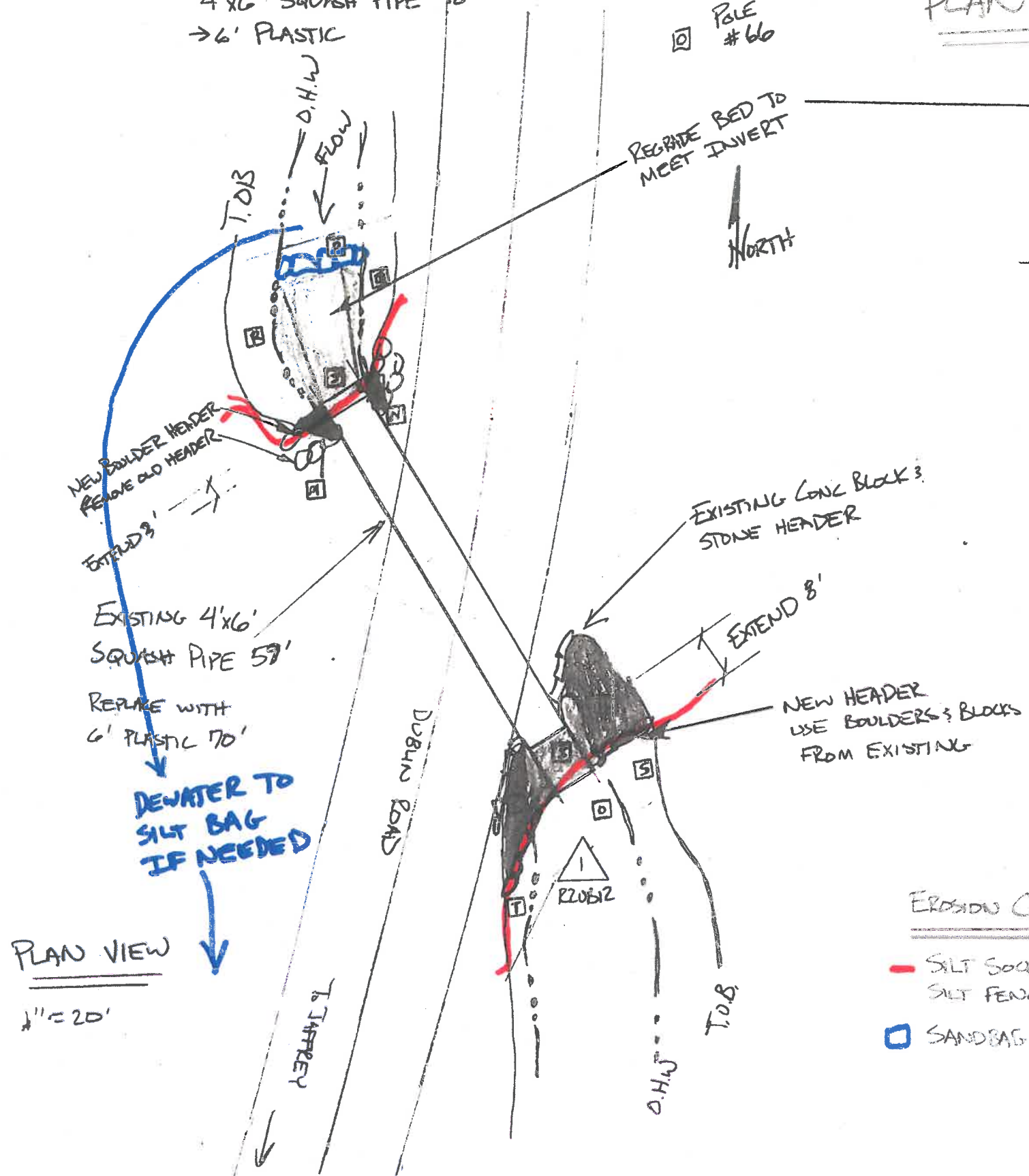
PLAN VIEW

1"=20'

- NHWS NOW WETLAND PERMANENT
- NHWS ALOE WETLAND PERMANENT
- TEMPORARY IMPACT
- WETLAND DESIGNATION
- ORDINARY HIGH WATER
- WETLAND IMPACT LOCATION

JAFFREY, DUBLIN ROAD

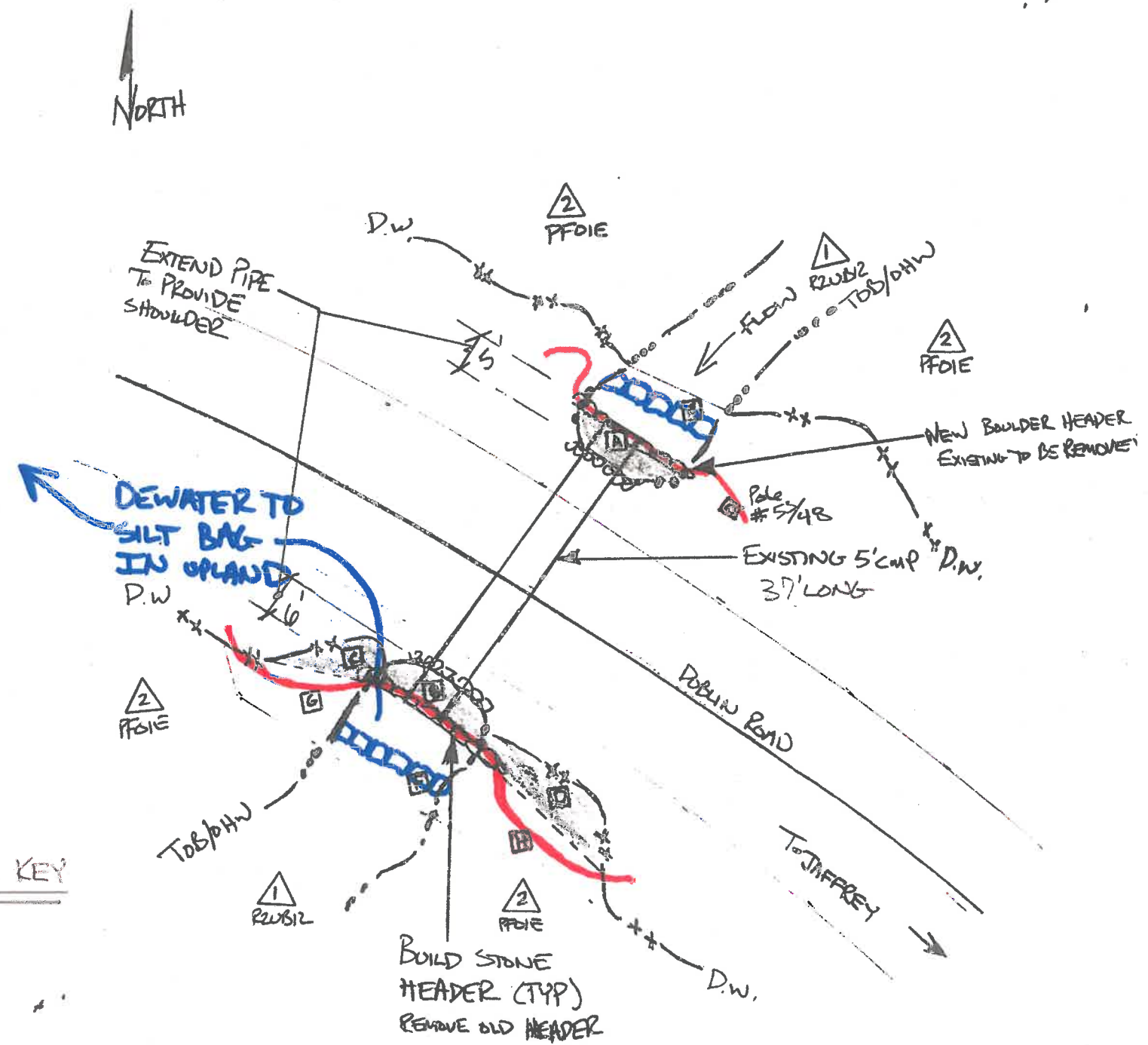
4'x6' SQUASH PIPE TB
→ 6' PLASTIC



EROSION CONTROL
PLAN JAFFREY

JAFFREY DUBLIN ROAD

5' DIAMETER CMP TO → 5' PLASTIC



PLAN VIEW

$$1'' = 20'$$